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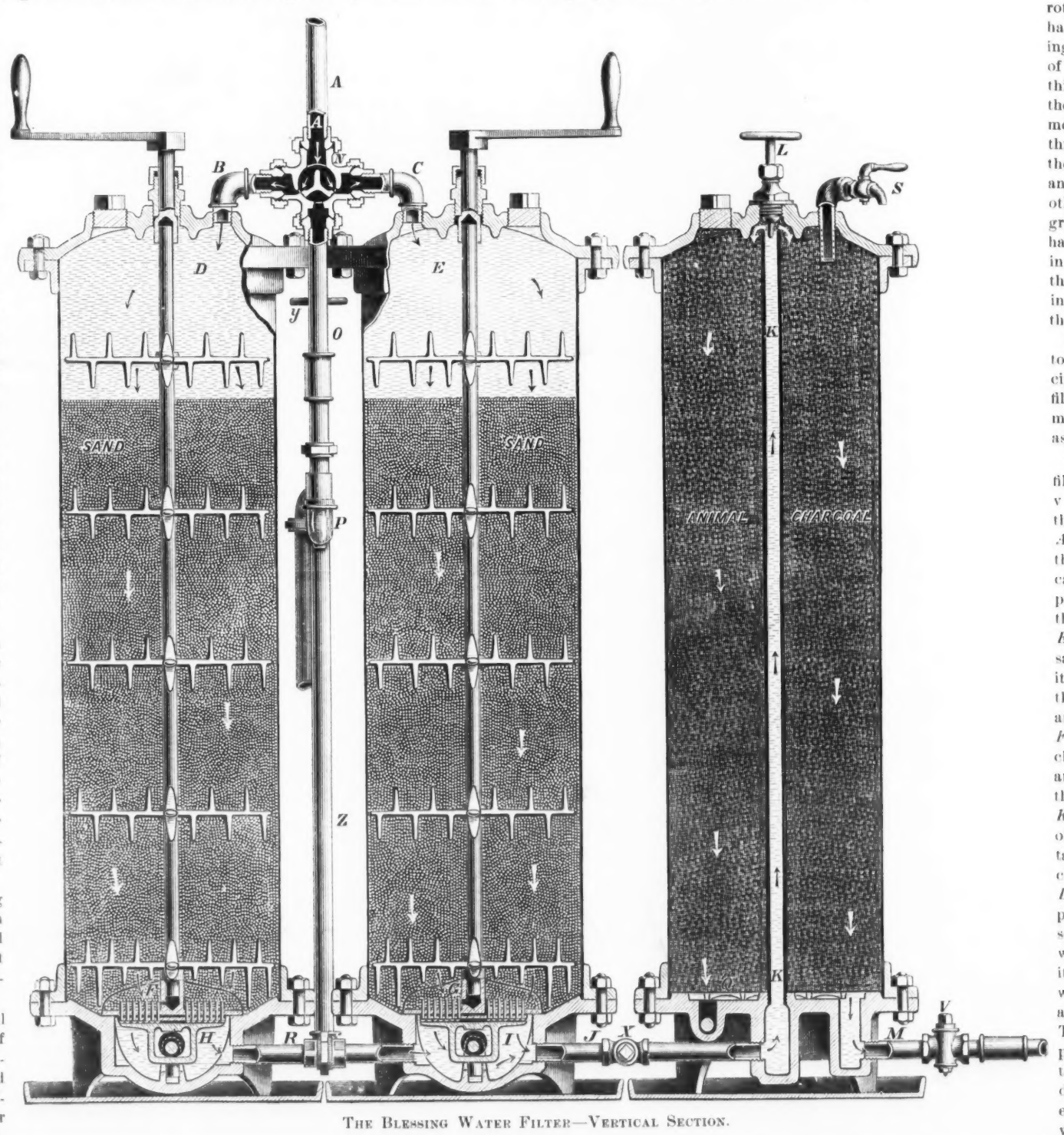
The Blessing Water Filter and Purifier.

The impure condition of the water furnished in the majority of the cities in this country has stimulated invention in the direction of providing convenient means of purifying it, not only for domestic use but for many purposes of manufacture. Of late years a good deal of attention has been given to the subject of water contamination, and serious disease has without difficulty been traced to the foreign matter contained in water supposed to be reasonably pure. While this is of vital importance to everyone—since all must use water—the quality of water as affecting certain articles of manufacture is often an important question.

We have previously referred to the plan of filtering water either in large or small quantities devised by James H. Blessing, and this week we are enabled to lay before our readers engravings representing one of the smaller sizes of these filters and purifiers, the size shown being adapted for connecting to the pipe so as to filter and purify the water before it enters the service pipes in a house or public building. A description of this will serve to show the principle upon which all sizes of these filters are constructed, there being no difference in this respect except in unimportant details.

The engraving on page 1 is a vertical section and that on page 2 part plan and part horizontal section.

The device will be seen to consist of three iron cylinders, two for sand and one—the purifying cylinder—for animal charcoal. The sand cylinders are nearly filled with fine sharp sand, through which the water is filtered; from these cylinders the filtered water goes to the purifying cylinder, through which it passes in contact with the animal charcoal. For some purposes the use of the purifier may not be required, and the arrangement is such that it may or may not be used, as desired.



THE BLESSING WATER FILTER—VERTICAL SECTION.

The sand cylinders are provided with an arrangement for thoroughly agitating the sand during the process of washing. This consists of radial arms mounted on a vertical shaft, which shaft can be rotated by a hand wheel or lever fastened to its upper end. These two sand cylinders rest on base pieces having communicating chambers. The upper ends of the cylinders are provided with bonnets firmly bolted to them, so as to withstand any ordinary pressure, and are connected together by means of a short pipe having in it a rolling valve contained in an outer shell which has four ports or openings, one for the admission of the water to be filtered, one on either side, to admit the water into the sand cylinders, and one, the fourth, through which the impure water is exhausted when washing. This valve is also provided with a hand lever for moving the same, having a quadrant on one of its ends, with a pointer attached to the valve case, indicating thereby the different positions of the valve during filtration and the cleansing of the filter. The cylinder containing the animal charcoal is not provided with the radial arms for stirring, as in the other two, stirring not being necessary, as the water is already thoroughly strained in passing through the sand cylinders before it enters the purifier. This cylinder is also provided with a base piece on which it rests, having a pipe connecting the chamber in the base with the chambers in the bases of the other two cylinders. This cylinder is also provided with air cocks at its top and bottom to aerate the charcoal when required.

The sand used is fine, and means must be taken to prevent its escape into the lower chambers and thence into the house pipes, where it would not only speedily ruin the cocks, but would in time fill and clog the pipes. The escape of sand is avoided by an ingenious device termed a sand valve. This consists of a plate having a number of holes drilled in it, in which are inserted pins or plungers about the one-hundredth part of an inch less in diameter than the holes, leaving a space for the water to ooze around each pin or plunger. This small space would become in time filled up, were it not for the following provision: The pins or plunger are fastened to a plate having a yoke cast on it, in which an eccentric is rotated by a small hand lever extending to the outside of the chambers; this rotation causes the pins to be moved up and down through the holes, thereby scraping off any dirt or any other foreign ingredient that may have gathered therein or on the pins, thus at once restoring the openings to their original size.

Having referred to some of the principal parts of this filter its operation may be described as follows:

The water to be filtered first enters valve-casing through the pipe *A*, going through the passages in the casing, and through pipes *B* and *C* into the cylinders *D* and *E*, containing the sand. From here it passes downward through the sand, and the sand valves *F* and *G*, into the chambers *H* and *I*, and thence through the pipes *R*, *J* and *K*, up into the top of the cylinder containing the animal charcoal. The valve *L* on the top of the pipe *K* being off its seat allows the water to continue its passage downward through the animal charcoal. The screen plate *Q*, placed at the bottom of the cylinder, prevents the escape of the coal with the water on its passage out, which, having now been thoroughly filtered and sufficiently long in contact with the coal, passes on its way through the pipe *M* for use. The filter receives all the water to be filtered through the pipe *A*, and discharges the same, filtered and purified, through the pipe *M*.

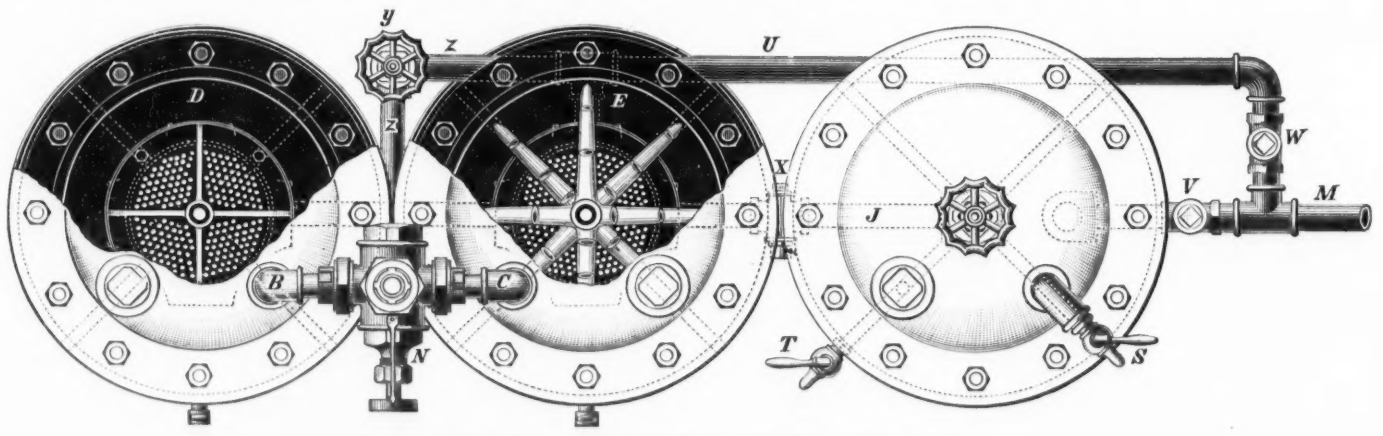
After running for a time and it becoming

necessary to cleanse the filter, the valve *N* is moved by means of a hand lever to either the right or left, by which motion one or the other of the pipes *B* or *C* will be in communication with the pipe *O*, connecting with the sewer, for conveying off the impurities from the sand cylinders during the process of washing. This pipe before entering the sewer has inserted in it an ordinary ball trap *P*, with a glass cup, which exhibits the condition of the water coming from the filter during the operation of cleansing, and admits of determining the moment when the filter is sufficiently cleansed. Now, suppose the valve *N* to have been moved so that the cylinder *D* and the pipes *B* and *O* are in communication; the water will then enter as usual through the pipes *A* and *C* into the cylinder *E*, pass down through the sand valve *G* into the lower chamber *I*, and through the pipe *R* into chamber *H* of cylinder *D*, and up through the sand valve *F* and sand in cylinder *D*, and through pipes *B* and *O* on its course to the sewer. After the water has been running this way for a few minutes, the sand will become loosened in the cylinder *D*, and the shaft with the radial arms attached can then readily be turned by the lever shown on top. The movement of these arms will more thoroughly stir up the sand and will remove any adhering particles of dirt, which will be carried out with the cleansing water. When the sand in cylinder *D* has become thoroughly cleansed, by reversing the valve *N*, bringing the cylinder *E* and pipes *C* and *O* in communication, the cleansing of the sand in cylinder *E* will be similarly affected. This having been accomplished and the valve returned to its central position, its regular working position (as shown in the cut), filtering through both cylinders will take place.

It will be observed that it is impossible while cleansing the filter to get any unfiltered water whatever into the house pipes; it will also be seen that one side of the filter is washed with filtered water from the other side; in other words, the filter is always washed with filtered water, and, therefore, no impure water—whether in the process of cleansing or filtering—ever comes in contact with the sand in the lower part of the sand cylinders. This is one of the advantages of the duplex system.

When it is desired to aerate the charcoal, the valve *L* can be screwed down on the top of the pipe K, closing the same, then closing cock *V* and opening air cock *S* and drip cock *T*, the water will run out of the contact cylinder and air will be drawn therein through the cock *S* to take ts place. The coal having become sufficiently aerated the filtering process will be continued as before by closing the cocks *S* and *T* and opening valves *L* and *V*. This aeration can be effected, if desired, during the time the sand is being washed in the sand cylinders. If for any reason it be found necessary to remove the charcoal from the cylinder, it can be readily done by simply removing the bonnet from the cylinder, and scooping the charcoal out, as it is not packed, but lies loosely in the cylinder.

These filters are made by the Albany Steam Trap Company, Albany, N. Y.



THE BLESSING WATER FILTER—PLAN AND HORIZONTAL SECTION.

Farming by Gaslight.

Howard county farmers residing in the vicinity of the great Shrader gas well, near Kokomo, Indiana, go on record as harvesting the first wheat by natural gas-light. A dozen self-binders and men shocking wheat at the lonely hour of midnight was truly a novel scene, which was witnessed by hundreds of people, who surrounded the fields of grain in carriages. The constant roar of the Shrader well can be distinctly heard eight miles away, while the light can be plainly seen at Burlington, fifteen miles west of here. The estimated flow of gas from this well is 15,000,000 cubic feet every twenty-four hours.—*Indianapolis Journal.*

Practical Drawing.

BY J. G. A. MEYER.

TWENTY-NINTH PAPER.

290. In Figs. 202, 203 and the projections of solids given in previous papers, all the full lines represent edges or the intersections of plane surfaces. But in Fig. 206, which represents a vertical projection of a cylinder, the lines *a e* and *b d* do not represent edges or the intersections of planes; here then the question arises, What do the lines *a e* and *b d* in Fig. 206 represent?

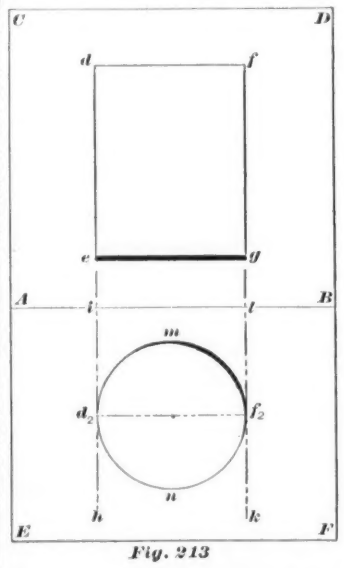


Fig. 213

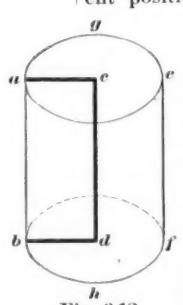


Fig. 212

PRACTICAL DRAWING.

This question leads us to the consideration of the cylinder, and after its definition and the manner of its projection are understood, then an answer to the foregoing question can be given, which will be more comprehensive than if we attempt to give it now.

THE CYLINDER.

291. *Definitions.* A cylinder is a solid which is bounded by two plane surfaces parallel to each other and a curved surface.

292. *Curved surfaces* are generated by lines moving according to some mathematical law, thus:

If any curve be taken in space and a straight line be drawn through any point of it, and then be moved around this curve, constantly touching the curve and always parallel to its first position, the surface generated by this straight line is called a cylindrical surface.

The moving line is called the generatrix of the surface, and the curve around which the generatrix moves is called its directrix.

293. The cylindrical surface can be generated by another method, thus: If any curve in space were to move along a straight line, the curve always remaining parallel to itself, this curve will also generate a cylindrical surface. In this case the moving curve is called the generatrix of the surface, and the straight line is called the directrix.

294. There is a particular class of cylinders whose curved surfaces can be generated by either one of the foregoing methods or by the following one:

Fig. 212; let *a c b d* be a rectangle (Art. 60) and assume this rectangle to be moving around one of its sides, *c d*, then the surface generated by the side *a b* will be a cylindrical surface, or the convex surface of a cylinder.

295. *Axis of the Cylinder.* The fixed line *c d*, about which the rectangle *a b c d* revolves, is called the axis of the cylinder.

296. *Bases of the cylinder.* The circles generated by the remaining sides *a c* and *b d* of the rectangle *a b c d* are called the bases of the cylinder.

297. *The altitude of a cylinder* is the perpendicular distance between the planes of bases.

298. *Elements of the cylindrical surfaces.* In a general sense, the lines of the cylindrical surface, which are determined by the different positions of the generatrix, are called the elements of the surface. In a more restricted sense, an element of a cylindrical surface is that line in the surface which coincides with the line *a b* (Fig. 212) in any position the latter may occupy in generating the surface. In short, an element of such cylindrical surface of which we shall treat in these papers is represented by a line parallel to the axis of the cylinder drawn on the curved surface. In these papers we shall treat only on cylinders such as shown in Fig. 212; and by the term "element" we shall always mean a straight line in the curved surface, lying parallel to the axis of the cylinder.

299. *Right Cylinder.* When the elements are perpendicular to the bases, as in Fig. 212, the cylinder is said to be a right cylinder.

300. Cylinders are generally named from their bases. If the base be an ellipse, a hyperbola, a parabola, the cylinder takes the name of cylinder with elliptical, hyperbolic or parabolic bases; and these cylindrical surfaces can only be generated by the first two methods. If the bases of a cylinder are circles, then it is named a cylinder with circular bases. Such cylinders have all their elements at the same distance from the axis; and this cylindrical surface can be generated by all the three methods given. This is the only class of cylinders treated of in geometry.

PROJECTION OF THE RIGHT CYLINDER

301. Let *A B E F* in Fig. 213 represent the horizontal plane of projection, *A B* the vertical plane of projection standing perpendicular to the former plane *A B E F*, and d_2 f_2 *m n* the top of a cylinder in space with its axis perpendicular to the horizontal plane of projection; it is required to find the projections of this cylinder. In geometry it is proved that a plane drawn tangent to the cylinder will touch its convex surface in a straight line and this line of contact will be parallel to the axis; but lines parallel to axis are elements of the surface, hence the line of contact of a plane tangent to the cylinder will be an element of the cylindrical surface.

Now in order to find the vertical projection of the cylinder we proceed as follows: Draw a line *h i* perpendicular to the line *A B* and also tangent to the circle d_2 f_2 *m n*; the line *h i* will represent a line in the projecting plane (Art. 236), the point d_2 a point in the line of contact, and the point *i* will represent a point in the line in which the projecting plane intersects the vertical plane of projection; in short, it represents a point in the trace (Art. 229) of the projecting plane. Now it must be readily perceived that since the projecting plane passes through the line containing the point d_2 and because this line is an element of the curved surface, the trace containing the point *i* must be the vertical projection of this element. Turning now the vertical plane of projection around the line *A B* until it is in a position as represented by the rectangle *A B C D*, and coincides with the horizontal plane *A B E F*, the trace containing the point *i* will appear as represented by the line *d i*; in fact, *d i* is the vertical projection of this trace and contains the projection of the element drawn through the point d_2; in a similar manner we find the vertical projection of the trace of the projecting plane passed through the point f_2

The lines *d f* and *e g* are the vertical projections of the bases, and are obtained in a similar manner as the projection of the base of a prism, the distance between them being equal to the altitude of the cylinder. Here then we have a rectangle whose sides *d e* and *f g* represent two elements of the convex surface of the cylinder, and the sides *d f* and *e g* the bases of the cylinder, and this rectangle *d e f g* is the vertical projection of the cylinder.

The manner of finding the horizontal projection of this cylinder is simple. Since the axis of the cylinder is perpendicular to the horizontal plane of projection, we assume the cylindrical surface to be produced or extended towards the plane *A B E F*, and allowing the former to intersect the latter the line of intersection will be the circumference of a circle equal to that of the bases, and this circumference will be the horizontal projection of the cylinder.

If the axis is not perpendicular to the horizontal plane *A B E F* then the intersection of this plane with the cylindrical surface produced will not be the horizontal projection of the cylinder, because all projecting planes must be perpendicular to the planes of projection, and these conditions will not be fulfilled by producing the convex surface of a cylinder which stands in an oblique position to the plane of projections. Examples of this kind will be given further on.

It may also be remarked here, and will be further explained hereafter, that when a cylinder with a circular base stands in an oblique position to a plane of projection or any other plane, its intersection with that plane will not be a circle.

302. From the foregoing we have the following simple method such as is used in the drawing room for making the two views of a cylinder.

First draw a circle d_2 f_2 *m n*, whose diameter is equal to that of the given cylinder; this circle will be the horizontal projection or the plan of the cylinder. Then draw two vertical lines *d* d_2 and *f* f_2 tangent to this

circle, and a little longer than necessary; above the circle draw a horizontal line *e g* at any convenient distance from the circle, and cutting the vertical lines at the points *e* and *g*; on the line *d e* lay off a point *d*, whose distance from the point *e* is equal to the altitude of the cylinder; through *d* draw the horizontal line *d f*, and thus completing the parallelogram *d e f g*, which will be the vertical projection or elevation of the cylinder.

Now we are in a position to give an answer to the last question, which was, What do the lines *a e* and *b d* in Fig. 206 represent?

The lines *a e* and *b d* in Fig. 206, and also the lines *d e* and *f g* in Fig. 213 represent the projections of the elements of cylindrical surfaces; they are the projections of those two elements which appear in each figure to occupy a position further from the axis of the cylinder.

Victor Delahaye, a machinist and member of the Municipal Council of Paris, is at present in this country observing the machinery used in various kinds of manufacture. It appears that the Machinists' Union of Paris has asked the French Government for a loan of something over a million dollars to start the manufacture of machinery at present imported. The manufacture is to be on the co-operative plan, the money loaned to be paid back in 60 years. Mr. Delahaye came here under instructions from the French Minister of Commerce and Industry, and will report to the French Government.

Dicrotic Steam and Water Lines.

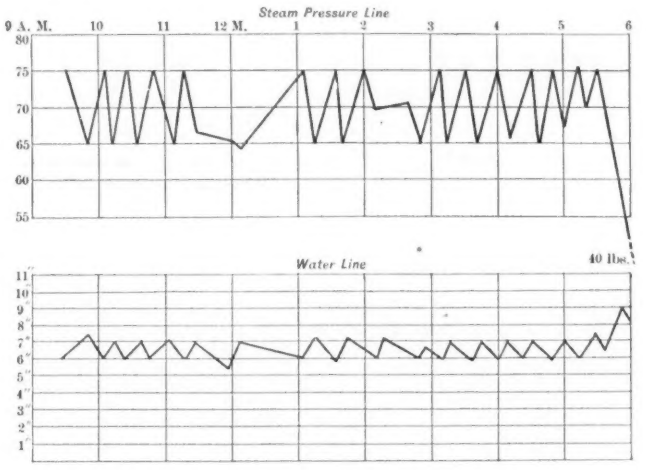
BY WILLIAM J. WILLIAMS.

It is said that 628 boiler explosions occurred in this country during the past year. The number of persons who lost their lives by these was 1,026; and 1,232 were injured. The average explosions per month were fifty-two, or two for each working day of the year. This is a ghastly record, and calculated to make one ask: What is necessary to make a steam boiler a safe thing to use? Those acquainted with the subject will say there are several things to be considered; but among them it will not be disputed that a steady and safe working pressure is one; and a constant safe water line is another.

The first having been determined to assist its being known when the limit has been reached, we have the steam gauge, and to prevent a greater accumulation, the safety valve. These two adjuncts of the steam boiler are in practice, so far as the pressure is concerned, considered sufficient. To supply the necessary feed-water, whatever means is used, it should be capable of furnishing it continuously, not intermittently. Yet it is an absolute fact that nothing is more common among defective steam boiler appliances than a miserable apology for a boiler feeder.

In connection with feeding, it is equally important that the means of ascertaining the height of the water in the boiler be of such construction that it will not get out of order, unless through gross negligence. With the type of boiler now generally in use, the return tubular, the water column contains the gauge cocks and the glass water gauge; it is attached to the boiler by two connections, one at a point in the water space, and the other in the steam space. From personal knowledge of a large number of boilers in daily use, these attachments are made in such a manner that no other word but "criminal" will do justice to the subject. The more pieces of pipe, and the more plain elbows that can be got into them, the better the job is apparently considered. These details, as they are called, are left to some one who has not sufficient knowledge to know how such work should be done; and there would seem to be no one about who does know and has sufficient backbone to rebel at such doings. The time will come, and has come, with some of these boilers, when they will be and are dangerous.

Enclosed are two diagrams, one representing the steam line, the other the water line of a steam boiler, carrying 75 lbs. pressure; 100 lbs. would be granted, if asked for. They are fair exponents of what that boiler undergoes every day. It is supplied with a feeding apparatus, the minimum capacity of which is about four times the requirements. The time observed was eight hours and twenty minutes. The feeding occupied two hours and six minutes. These diagrams are part of a series that were taken. These attached are no better nor no worse than the rest.



DIAGRAMS OF STEAM AND WATER LINES.

Musical Fire Engines.

One of the latest wrinkles is a steam fire engine with music-box attachment. The only wonder is that so simple and so inspiriting a device was not tried long ago. What could be more in harmony, with the surroundings at an extensive conflagration caused by the explosion of fireworks on the Fourth of July, than a bevy of fire engines merrily pumping away to the tune of Hail Columbia or Yankee Doodle?

Then, too, some towns have facilities for putting out fires while neighboring towns, less enterprising but quite as able financially, think best to rub along without any, to avoid spending a little money, until suddenly a conflagration comes and in an hour or two destroys property enough to have paid for protection many times over. In such cases the enterprising town is frequently generous, as well, and loans its engine. On such an occasion the loan of a musical fire engine playing soothing airs might be made a real benefaction. In whatever light one looks at the proposed combination of wind and water, let us say, for fire purposes, it appears to possess marked advantages.

We endorse the following, which we take from the *Maritime Reporter*. It is easy to grumble about a pilot for not getting "square" into slips along the rivers, but if some of the grumblers were to try for about ten years to learn the pilot's business, and then find they did not know much about it, they would be wiser than they are.

How often when a pilot of one of our river steamboats or ferryboats makes a miss in getting his boat into the slip, the passengers turn up their faces to the pilot in wonder and surprise, and if they are delayed a few minutes he is sure to get abused. They do not stop to think how often he has brought his boat (through fog so thick that you hardly could see five feet ahead) safe to her berth. No, this is all forgotten. The boat traveling public can put this down as a fact—when a New York pilot cannot bring a boat in and around this harbor no other man can. They know their business, and no more careful and steady body of men can be found in their profession.

According to the *Fireman's Herald* about one-third of all fires are of incendiary origin.

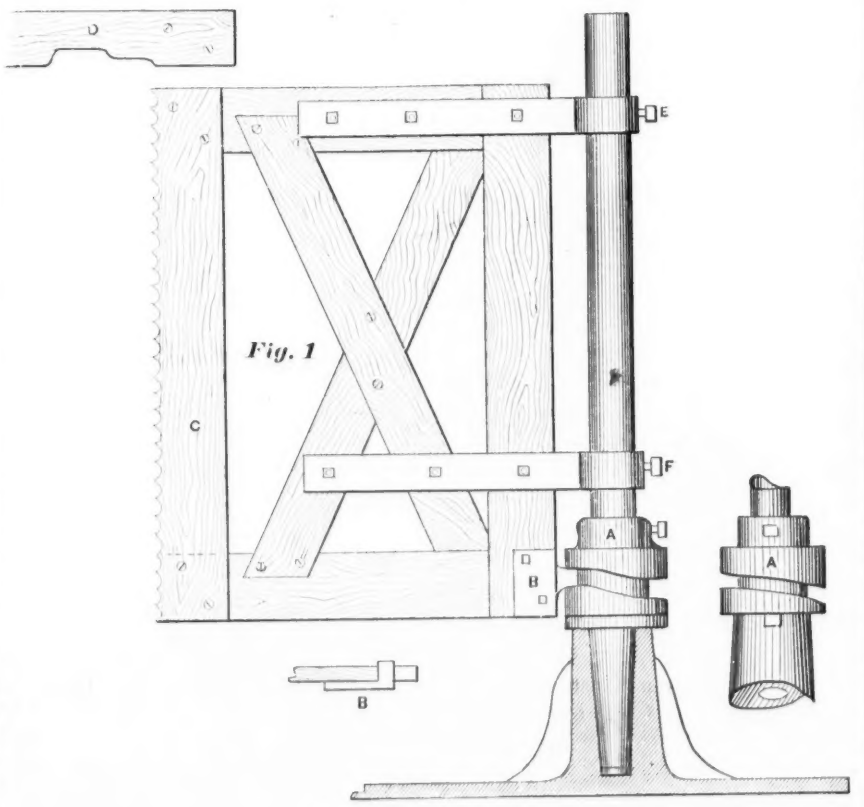


Fig. 1

SWEEPING GROOVED DRUMS.

Sweeping Grooved Hoisting Drums.

BY P. S. DINGEY.

Fig. 1 shows one way of sweeping up hoisting drums in loam. The usual way of allowing one or two fingers to travel the whole length of drum, by means of a long screw and gears, is an expensive way, requiring a costly outfit. It will be seen by Fig. 1 that the long screw and attachments are discarded, and that the sweep is made the whole length of drum, and is required to travel up and down only one thread. This, of course, will make a continuous thread, the same as if a long screw were used.

As the sweep is turned around, it rises by means of a pin plate, fastened on bottom of sweep, and working in the groove cut in *A*. This groove must be cut the same pitch as grooves in drum are intended to be. Other views of *A* and *B* are show by corresponding letters.

After sweeping grooved part of drum, the part *C* of sweep may be taken off, and a piece like *D* fastened to top of sweep, for striking flange, and a guide around top, for setting the cope by. While sweeping the groove, the spindle has remained stationary; but now it must revolve with the sweep. To do this, set screws *E* and *F* must be tightened. Take pin plate *B* off sweep, loosen set screw in *A*, and slip *A* up, out of the slot in socket; and tighten screw to keep from slipping down again. This will allow sweep and spindle to revolve in the ordinary way.

For large drums it is necessary to support the top of spindle by a temporary cross-beam, and also to have a counter-balance weight to help the rising of sweep; but for drums from 3 to 6 feet diameter no cross-beam or weight will be needed.

This way of sweeping drums will be found as quick as any I know of; but if I had a number of 3 or 4-feet drums to make, the cheapest way to make them, I think, would be to make a pattern for them.

A Yankee Piston in a British Steamship.

We made a note, last February, of what we thought was quick time in making a new piston for the steamship Alaska, the work being done at the Delamater Iron Works in this city. The piston was 100 inches diameter, weighed 13,000 lbs., and was finished and put in place ready for a start in six days from the time of receiving the order. It was sharp work, but the job was done as well as if two months had been taken in doing it.

The sequel to this job is of interest. When the Alaska arrived in England it was gravely concluded at the company's offices that there must be something wrong about a piston made as quickly as this was made. True, there was, after a voyage across the Atlantic, no evidence of anything wrong, but this did not count. The piston was taken out and one of English make substituted.

On the morning of the third of July the mate to this piston broke, off the Irish coast, and the Yankee piston was put in its place, and is there yet, for all we know. Thus this piston, "set at naught by the builders," has taken the place of two English pistons, and we have no doubt will last to replace several others. There are some things that our bright English relatives have yet to learn. One of these is that American made castings are materially stronger than castings made in England; another, that we know, in this country, how to make strong castings without cooling them all summer.

There is one thing in connection with this matter that is pleasant to relate. That is the fact that although the Yankee piston was, the second time, put in place in the mate to the cylinder to which it was fitted, and required considerable fitting to the cylinder in which it was used, necessitating hoisting it out and in the cylinder several times with no other facilities than the ship's tackle, the job was completed by Chief Engineer Williams in fourteen hours. We have interviewed several American engineers who were passengers on the Alaska, and they speak in the highest praise of Mr. Williams' ability, and, under the circumstances, the remarkably quick time he made.

A correspondent writes us to say that he has tested boilers by means of injectors not specially made for the purpose, and found no trouble in working the injectors against more than double the pressure in the boiler from which steam was taken.

Graphite Anti-Friction Bearings for Machinery.

The engravings presented with this represent the construction of these bearings. The theory of their efficiency is based upon the well-known fact that graphite has peculiar lubricating qualities that can be made to dispense with other means of lubrication.

In their construction about one-half the metal is removed, the recesses being filled with a composition which is nearly pure graphite. This composition is hardened by a peculiar process, and is not affected by anything it is subjected to in use.

For ordinary purposes no lubrication whatever except that afforded by the graphite is required; in special cases it may be advisable to use a small quantity of oil at first.

The graphite filling does not require renewing, the filling and shell wearing down together.

These bearings have been in use long enough to substantiate their merits, and are highly commended by parties who have them in use. The manufacturers are the Graphite Lubricating Company, Jersey City, N. J.

It is said that a German has invented a method of reproducing the print of any book on the lithographic stone. If this is true, rare old books will be materially cheapened.

A Tribute to Engineering Skill.

The following tribute to the skill of the engineer is from a series of "Round the World Letters," written by Hon. D. N. Richardson to *The American Rural Home*. As an artistic piece of word-painting it will bear reading more than once:

"We are on the famous Gothard line, the railroad route that makes sport of difficulties once called insurmountable. There are people who challenge your admiration. High up among these is the civil engineer. Give him his tools, say where you want to go, put money in his purse, and he will get there—over, under, through or round about. The work will ripen, sure as fate. He climbed these mountains here for many a mile, without a reverse—made lengthy loops far underground, to gain more altitude; now channeling the mountain's upright face; now striding across a mighty torrent; now burrowing in the mountain's rocky rumps, mining about at varying grade and curve, as though wrought in open air, comes out just where you'd think he couldn't come, but at just the place he wanted to.

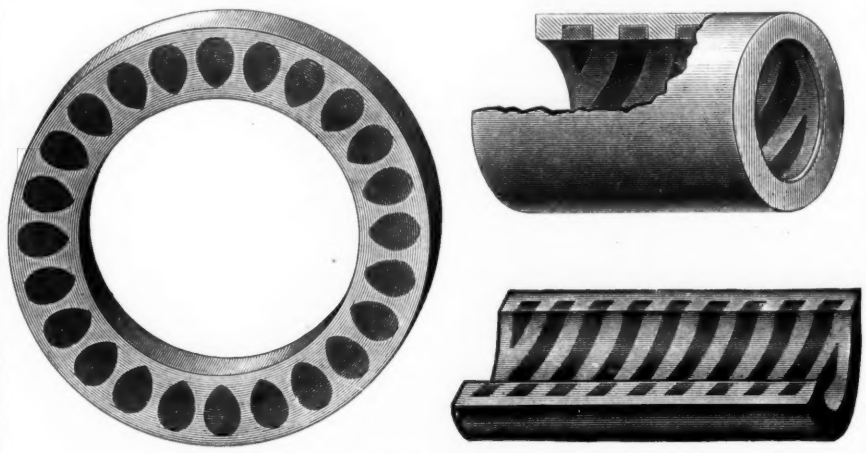
"It takes two hours or so after you have quit the lake shore work to get up to the tunnel, and every foot a fight with mountain obstacles. Every inch bids the engineer defiance—dares him to take another step. Coolly he consults his instruments, plans an attack, and carries every point. Exteriors head him off. No matter, he goes inside. At Airolo the outdone Alpine king mustered all his forces—presented a solid breastwork to our engineer. Two thousand feet or more of solid rock opposed the man of levels; a stony army, ten miles of flinty ranks to fight. Right there our hero quits the surface. If the enemy won't fight fair upon an open field, he will quit the surface altogether. He disappears awhile—in time appears quite on the enemy's rear, ten miles or so away. The Alpine monarch gave it up—and he who has controlled the march of armies—marking the cost, the time, the seasons when they might painfully, patiently pass his strong dominions, paying him costly tribute every time, has yielded to this youthful engineering David, and is now as meek and mild as your pliant prairie king. The steam horse comes and goes, sports round among these Alpine limbs and ribs, puffs smoke into his scowling, helpless face, even blows his mighty horn in the imperial ear. So are the mighty fallen! So has the little man of calculating ways, with bits of glass and brass and pencil stub, quite conquered this long-time Mediterranean monarch. Mind so conquers matter, and science wears the crown."

Chats with Foundrymen.

By Robert E. Masters.

The question has often been asked, How much will iron expand under constant heat? and numbers of experiments have been made to arrive at a correct conclusion. The case in point seems to prove it is owing to the circumstances and surroundings what the elongation of cast-iron will be.

In 1874 one of the foundries connected with a certain works was converted into a pipe foundry: three large core ovens were



Graphite Bearings.

built on a bank or side hill at the back of the foundry. The floor of the oven *A* was, of course, on a level with the foundry floor, and the bottom of the ash pit *B* (see plan and section, Figs. 1 and 2) was on a level with the ground back of the foundry. At *C* there was a cast-iron hood to turn the flame down and keep it from scorching the end of the pipe moulds.

D E and *F* show three views of the cast-iron ties or sleepers used inside of the oven. They were 10″ wide, 1½″ thick, with a rib 1″ thick between the jaws. The original

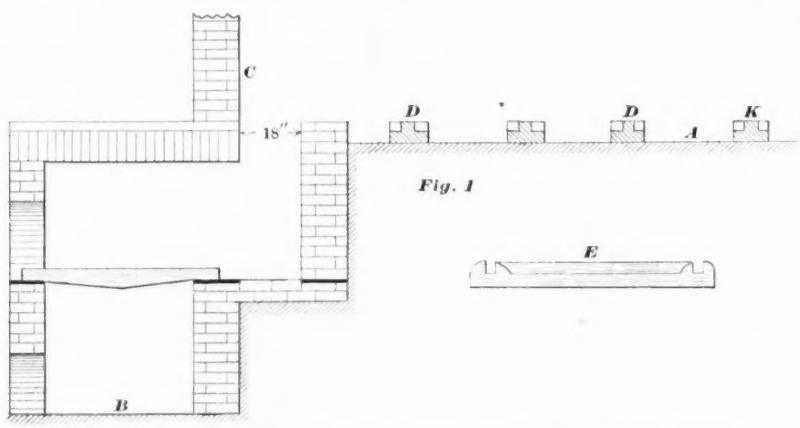


Fig. 1

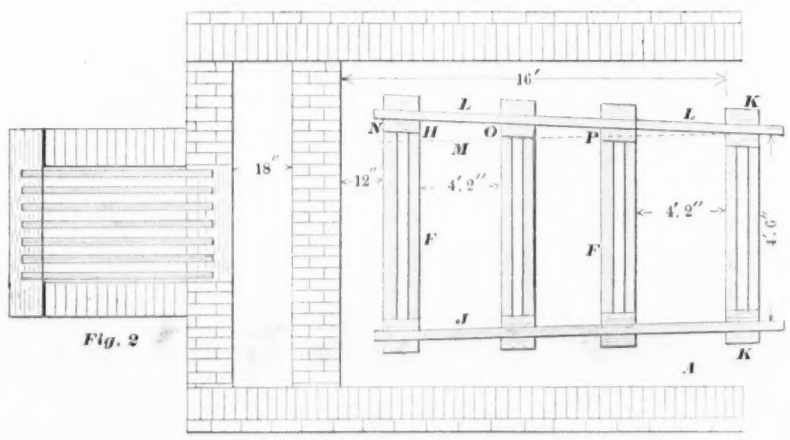


Fig. 2

Core Oven.

length was 4′ 6″ inside of jaws, which were 4″ deep and 2″ wide; the tracks inside of the oven were cast-iron bars 2″×6″×18′. When building the carriages the wheels were set to a gauge to just give clearance enough to not bind on the rail. The wheels are 3″ tread and the average weight on the trucks, counting carriage frame, loam casings, etc., was about 8 tons; the ties rested on a good brick foundation.

For several years past there have been almost constant fires in these ovens, while the carriages are out through the day; the cores were dried, and the carriages run in at night loaded with loam casings. A good portion of the time a night and day force were at work, and the ovens never got a chance to cool off. Finally every time the carriage was run in the oven the wheel on one side or the other of the end of the carriage nearest the fire pit would run off the track and drop down at *H* or *J*, and it was not a very pleasant or easy job to get it back again with such a load in an oven that was hot enough to "sizz" in any part of it.

Investigation showed that at the first tie *K*, which was just outside the oven doors, the track was of the original gauge; from there into the oven the track began to spread, being widest next to the fire pit. Work was stopped and the ovens cooled off, but the circumstances were not altered. A number of trials with the empty carriage gave the same results, and the tracks in the other ovens were found to be in the same condition. The rail *L* was taken up, and it required considerable sledging and wedging to get it up, being bound so tightly to the jaws of the ties that it was thought at one time the ties would have to be broken to get them off the rail.

The inside lugs and part of the rib was cut off the ties, the ribs dressed down square and the rail set against them, as shown by the dotted line *M*, and wedged between the rail and outside lugs: 2½″ was cut away at *N*, 1¾″ at *O*, and 1″ at *P*. I would hardly have believed the above circumstances had I not been an eye-witness, with several others, at the investigation and making the change. This experience will suggest when this style of cross tie is used in ovens where there is constantly a very high temperature, to leave room to wedge between the inside lugs and the rail; in case of any great expansion the wedges could be transferred to the outside of the rail.

Some very queer things occur at times in foundries, either from mistakes or experiments, and even if the results are not always satisfactory, if they were made known they would be valuable to others, if for nothing else than the saving of time and material. Edward H. Putnam, foreman of the Economist Plow Works, South Bend, Indiana, says "Our furnace man threw in a lot of elm wood chunks along with the rest of the wood to fire up the bed of coal in the cupola, and, after the bottom was dropped, he found some of the charred chunks among the cinder, and every casting in the heat was 'white hard.' With the exception of the elm wood the conditions and the material were the same as in previous heats."

We often hear foundrymen talk about malleable iron, etc., burning up in the cupola. Frank J. Taggart, superintendent St. Louis malleable iron works, formerly superintendent of the malleable works at Freeport, Illinois, has had considerable experience in this direction, and he relates: "At the Freeport foundry we have melted from 6,000 to 8,000 pounds of iron at a heat and run it into moulds for malleable iron castings, and used nothing but malleable iron scrap, without allowing any greater percentage for loss in melting than with any other iron."

While I would not advise the use of malleable iron scrap to any great extent for soft gray iron castings. The above statement, which Mr. Taggart gave me the privilege of making, and which he says he has frequently done, goes to prove that there is no great loss from burning up.

City Ownership of Water-Works.

The daily papers published in the flourishing city of Bridgeport, Conn., have for weeks been full of the details of a complicated wrangle over the relations of the water company with the city. The citizens, however, are beginning to see a new light in the matter. In a recent editorial the *Daily Standard* says:

It would seem that whatever has proven advantageous and advisable in the details of municipal management, with other cities in the country, ought, under similar circumstances and conditions, to be equally so with Bridgeport. This is a plain business proposition and one which, probably, needs no argument with the average business man. Now it is a fact that a large majority of the cities and towns in the United States own and control their own water supply, and find it a matter of convenience and profit so to do. Not many years ago Hartford came into possession of its water-works at a cost of about $1,600,000. To-day nearly half of that debt has been wiped out by the surplus annual revenue and all current expenses have been paid. Let us consider the possibilities of the case in Bridgeport. We presume that the old water company would sell out at a reasonable valuation, and the franchise of the new company provides for its assumption by the city. The city should own and control all, if any, of the sources of supply. The funds to make this purchase could be borrowed at a rate not higher than 3½ per cent., as the investment would be a long one and first-class in every particular. We have it from the very best authority that not less than $120,000 annual income could be derived from the water supply by the city under fair management. Of this less than one-fifth would pay all current annual expenses, including the new pipes needed and the replacing of some old ones. Two-fifths more would pay the interest account on over $1,300 000, a larger sum, probably, than would be required, and thus nearly $50,000 annual surplus would constitute a sinking fund before which the principal of the indebtedness would steadily and rapidly melt away. In less than twenty years the water works owned and controlled by the city, would become a source of unencumbered revenue which would prove a telling item for taxpayers in the city expenses. Moreover, the city could, as other cities do, make and enforce reasonable rules to prevent the waste of water, impossible under the present management; could regulate the supply, keep the sources pure, the pipes in proper order for all city purposes, and get its own supply at a much cheaper rate than at present.

Pipe Threading and Cutting Machine—Adjustable Expanding Screw Cutting Die.

The engraving of pipe threading machine represents the No. 0 size, made by D. Saunders' Sons, Yonkers, N. Y. This size machine is designed for cutting pipe from $\frac{1}{8}$ inch to $\frac{3}{4}$ inch, and by combining with it the No. 1 lever nipple chuck it is a very complete machine for making nipples of the sizes given above. The machine is designed with much care, and with special reference to doing good and rapid work. A feature of importance is the proportioning of the speed and power so as to give practically uniform cutting speed for the different sizes of pipe, thus adapting it equally to either size.

The chuck is arranged so that the gripping jaws are quickly and powerfully operated without stopping the rotating motion of the chuck, thus saving the time in stopping, also the screwing and unscrewing of the gripping jaws, as is the case with the ordinary pipe machine chuck. The arrangement of the gripping jaws is such they can be quickly altered to hold any of the various sizes of pipe from $\frac{1}{8}$ inch to $\frac{3}{4}$ inch.

The die head has open or expanding adjustable dies in halves, and of new design. These are so arranged on the face of the die blocks or slides that close threads can be cut. They are easily adjusted and opened instantly by the lever when the requisite thread has been cut, without stopping or reversing the motion. The dies expand wide enough to pass the pipe through for cutting off, and held clear of the chasers by special half bushings for steadying the pipe while being cut off.

The cutting off arrangement is very complete; the pipe is steadied and released by the movement of a lever, and the cutting off tool operated by another lever. The lever gives a quick and powerful movement, saving the time of screwing and unscrewing, as in the use of a screw movement.

This machine gives general satisfaction, being a practical and reliable tool and adapted to all the various kinds of pipe cutting with least loss of time. And when combined with No. 1 lever nipple chuck makes a very complete machine for making nipples $\frac{1}{8}$ to $\frac{3}{4}$.

The expanding screw cutting die made by the same firm can be attached to any of the ordinary pipe machines.

The advantages of these dies are, they can be enlarged or reduced as may be required, and are so arranged that the halves are opened by the lever as soon as the thread is cut as far as required, and the pipe taken out without reversing it.

These dies do not require to be moved from their place while cutting off the pipe, as they expand to allow the pipe to pass through into the guide in the cutting off head of the machine. The cutters or chasers can be taken out and sharpened by grinding; when too much worn they can be rehobbed and used again; which operation can be repeated several times.

This style of die has but one head, with sets of two slides or die blocks, and half dies or chasers attached for each size. To change from one size to another, place the lever in an upright position, then withdraw the die-blocks with the chasers, and replace them with another set the size wanted.

As a general rule, the civil engineer isn't the monarch of all he surveys.—*Rochester Post.*

If he were, he would hire an engineer.—*N. Y. Mail and Express.*

Likewise, the mechanical engineer is not greatly in the monarch business, though frequently a royal good fellow.

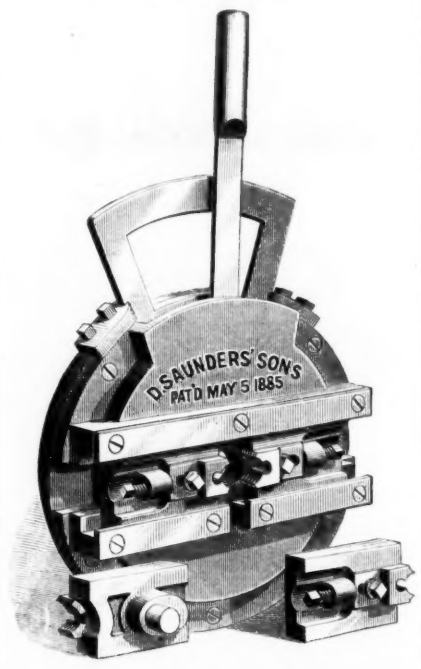
By the provisions of a law recently enacted in Texas, companies chartered out of the State must get permission from the Secretary of State before they can do business there.

LETTERS FROM PRACTICAL MEN.

Spontaneous Combustion.

Editor American Machinist:

In 1883 the subject of spontaneous combustion was brought to our attention by the sweepings from the floor of our factory developing an alarming increase in heat when placed in heaps. The floor had been sprinkled and the sweepings were moist. During the afternoon they began to heat, and a thermometer placed in the pile, after it had been disturbed, indicated about 200° F. It being time to close the factory for the night the sweepings were thrown out.



EXPANDING SCREW CUTTING DIE.

One day during the next year a peculiar odor was noticed in the factory, which increased and became very unpleasant. This was found to emanate from a barrel of shavings and chips from the boring and mortising machines. These shavings and chips are removed from the throats of our plane stocks, which are previously saturated with warm linseed oil. When the cover was removed from the barrel the fumes were quite strong; the shavings were so hot that the hand could not be held in them without being burnt. This barrel was removed to a vacant lot, covered with an oilcloth, and left. That night, during a heavy storm, the cover was blown off and the shavings wet. They kept hot a long time, but did not char. We then directed the removal from the building of all shavings and sawdust made from oiled wood as soon as made.

During one day last year we had been sawing the oiled plane stocks, and at night, when removing the box under the saw containing the sawdust that had fallen into it during the day, it was noticed to be very hot. It was placed at a safe distance from the building, and in the morning the sawdust was burning. A light misty rain had set in during the night. The fire was extinguished, but the rain continued and increased. Before noon the dust was burning again.

During the month of June last we were planing our oiled stocks on a hand (or buzz) planer, and (on June 10th) filled four sugar barrels with the shavings. Water had been spilt on some of the shavings that were put in one of these barrels, and these shavings soon began to heat. A thermometer placed in among these shavings indicated a rapidly rising temperature, and at 6 P. M. of the next day the shavings at the top of the barrel began to char They were then placed outdoors under a wrought-iron boiler bonnet, and covered with a metal plate. The next morning, upon removing the metal plate, we found that the shavings were charred and had shrunk into a cylinder-shaped mass, with a 3 inch space between it and the sides of the barrel, making the shrinkage 6 inches across the top. Upon disturbing this mass it broke into flames. Later in the day sawdust (from oiled beech wood) that had been deposited in a box as it left the saw the day before, began to burn, setting fire to the pine box containing the dust. This box, with the dust, had been placed in an old iron smokestack lying upon the ground at a distance from the buildings.

GAGE TOOL COMPANY.
Vineland, N. J.

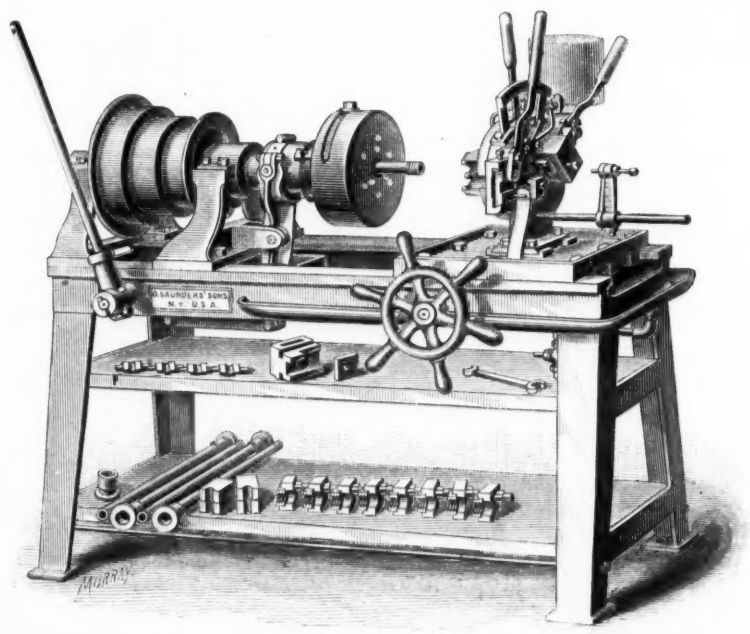
The Ramsbottom Packing Ring.

Editor American Machinist:

I take pleasure in correcting a misstatement in your issue of July 9th.

Mr. Porter says the piston ring acting by its own elasticity was first employed by Mr. Ramsbottom, the superintendent of the London and Northwestern Railway Company, some twenty-five years ago, and that his ring was parallel, of equal depth all round, and of wrought-iron; also that he had used them himself with very poor results, as they wore very unequally.

The above paragraph would go to show that the Ramsbottom ring was a poor ring, and of no value, which is not the case, or there would not have been about 25,000 of them in use nearly twenty years ago. How many are now in use in England and this country I am unable to tell; but they must be counted by thousands upon thousands.



PIPE THREADING MACHINE.

Thirty-three years ago, when I was an apprentice in Manchester, England, I used to be sent for small gear castings to Peter Rockwell Jacksons, Oldfield Lane, Salford, and, boy-like, tried to see what was going on. There I saw Ramsbottom rings of all sizes, from 10″ to 26″, by the bushel. They might have had smaller and larger than these sizes; but I am speaking from memory. They were all made from steel wire, specially made to different-sized, oblong sections, with one edge rounded, that rounded edge always bent to the inside, as near as I can remember. I am not far wide of the mark in saying the 10″ rings were $\frac{1}{4}$″ wide by $\frac{5}{16}$″ deep; 18″ rings, $\frac{3}{8}$″ by $\frac{7}{16}$″; 24″ rings, $\frac{1}{2}$″ by $\frac{9}{16}$″. These rings were not turned, but bent in some kind of a machine; but I cannot recollect seeing the machine.

Mr. Porter says he used these rings of wrought-iron, with poor results, and well he might. He could not expect anything else from making a spring ring of wrought-iron. Let him try a buggy and car spring of wrought-iron and give us the result.

I worked for a man who would not buy real Ramsbottom rings from the only makers, but who made wrought-iron ones, and when I came to spring them over the head, there was always a flat space opposite the cut, where the ring would set out of round, and not spring back again; the ring would blow through every time.

I write the above in justice to Mr. Ramsbottom and his ring, which, if made properly, of the right material, will give good satisfaction for high speeds and moderate sizes.

It would be better to be careful of facts, before making statements such as I have endeavored to correct. Mr. Ramsbottom is a self-made man, a mechanic, and (if alive) one of the greatest lights on railroad matters in the world.

GEORGE ROBERT RAY,
Pres. Manistee Iron Works Co.
Manistee, Mich.

Machine Tools on Three Legs.

Editor American Machinist:

When any one proposes to rest a machine on three legs, as Mr. Woodward does in your issue of the 16th, I cannot well let the subject pass without "putting my foot on it," particularly on the one leg.

While I am probably not the first one to rest a machine on three points of support, nor likely its only champion, I have advocated the principle for twenty years, and applied it to all the lathes, planers, engines and other machines I have built, and mention this to justify myself in assuming to say that Mr. Woodward's method of putting the principle in practice is not the best or even a good one.

The objection is that a lathe or machine of that character, if mounted on three legs, can be too easily upset, and there is no reason for introducing this objection; for by casting the two foot-stock legs in one piece, and in pretty nearly the usual way, and attaching the casting to the bed by a single pivoted bolt, running parallel with the bed of the machine, the three points of support are equally well or better obtained, and the liability to tip over, or be upset by some accidental thrust, is avoided.

The surface plates, measuring machine and planer, and all the foot-lathes, built at the Cornell university machine shop while I was there, had the three points of support and the lathes carried out as above suggested. This is also true of the screw machines built by the Pratt & Whitney Company, I believe. The objections to the three legs are that they not only look unstable, but are so; and machines so made will not sell. And the objection to those made on the plan I advocate is that no one ever notices the difference, and they do not advertise themselves.

They are right, however, and I notice that there is never half as much fuss made over things that are right as those that are wrong.

JOHN E. SWEET.

Air in a Fire Pump.

Editor American Machinist:

"Engineer," in your issue of July 16th, tells of trouble with his fire pump, and asks for suggestions as to the cause.

If air comes out, it certainly must get in, and the only chances for that are either a leaky pipe, a leaky stuffing box, or air entering at the end of suction, in little eddies or whirlpools. In this case, as the pipe is known to be tight, and the trouble is intermittent, the last is probably the cause. If the suction is strong, and the end of the pipe not very deep in the water, these ed-

dies will be more apt to form; and when once the air has got into the pipe, the pump will "jump," until it is all out. The longer the pipe, the more time it will take. As these eddies always try to assume a vertical position, they can often be stopped by putting a board or piece of flat sheet-iron just under the surface of the water, at the point where they form.

PETER H. BULLOCK.

Boiler Setting.

Editor American Machinist:

As I have received the benefit of many ideas from the AMERICAN MACHINIST I want to contribute one, if possible. It is in regard to bridge wall and combustion chambers for boilers. I have changed from the ordinary form of setting to that which I will try and describe, twice, the result being that whereas steam could not be kept up before the change, after it was made there was no trouble whatever.

As will be seen by the sketch, in which the bridge wall is shown section lined, I make the opening above the bridge wall 12 inches, and wide enough to give one-third more area than that of the chimney; if the latter is about right for the boiler, that is not greatly too large.

Near the back end of the boiler I build a second bridge wall straight across, and 12 inches below the shell. Between these bridge walls I leave a combustion chamber, the bottom of which is level with the top of grates.

The grates should be from 20″ to 30″ below the shell, never less than 20″.

At the back end of boiler I leave an opening to the floor line for soot and ashes. I got this plan of boiler setting from an old foreman. I found that boilers set in this way would steam with doors open. My idea is that with the ordinary bridge wall when the doors are open the cold air passes around the shell way above the fire, cooling the boiler very rapidly. With this bridge wall the air must pass directly over the fire.

JOHN A. HANS.

Ravenna, Cal.

Shutting Off a Disabled Locomotive Cylinder by Plugging the Exhaust Tip.

Editor American Machinist:

Among the unpleasant things in locomotive engine running are the breakdowns or failures of various parts of the machine. Intelligent and careful examination have done much to avert these troubles and delays, when supplemented by a study of cause and effect, or from effect to cause. With all the care, however, exercised by our best men, they will sometimes get "hung up" by the breakage of the valve yoke, valve, or bridges, or of some other part that they are unable to examine each trip, and when this difficulty has come, the ability to get out of it the easiest and quickest is of great value.

The removal of the valve chest cover, to close the ports with the valve, the securing the valve in position, getting the cover on again and getting it tight, are none of them easy jobs, and no one, I think, would go to all this trouble if he knew of an easier way applicable to their particular case.

A friend makes use of the device I now describe, and which he finds to work satisfactorily and to be very easily applied. His arrangement is a turned soft wood plug of conical form, 4″ diameter at large end, 2″ diameter at small end, and 4″ long; it is cut into three or four pieces of equal size by radial longitudinal cuts, either by sawing or splitting; each piece has attached to its small end a piece of soft iron wire of suitable length to handle, and fasten the block in position by. When using this device the pieces are inserted, large end down, one after the other in the exhaust tip of the disabled side (which in his case is $3\frac{1}{8}$″ diameter) and drawn up by the attached wires until even with each other and snug in the tip; the wires are now fastened to any convenient point of attachment to hold the pieces in place until the steam reaches them, when they will be very firmly pressed to place and swelled so as to stop leakage.

There are, of course, cases where this could not be used at all, as where both sides exhaust through a single tip. I think, however, there is enough of value and novelty in the idea to excuse its being brought to notice.

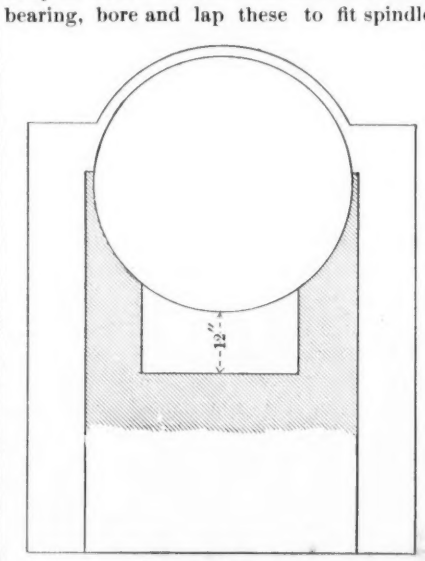
CHAS. S. BEACH.

Bennington, Vt.

Setting Bearings in Line.

Editor American Machinist:

I have got many a useful hint from the AMERICAN MACHINIST. I now beg to offer one that may be useful to some of your readers. It is often troublesome to bore two holes at some distance from one another absolutely in line with one another and square with one or more other surfaces. A convenient way of getting over the difficulty is thus: Cast a thin shell for each bearing, bore and lap these to fit spindle



BOILER SETTING.

perfectly, cast the main bearings so that the shells will go inside and leave from $\frac{1}{8}$″ to $\frac{3}{16}$″ space all around. Slip the shells on the spindle, put spindle in its place and adjust it (by wedges, set screws or special jig) absolutely true, then run sulphur in the space between shells and main casting. When cold, the spindle will be perfectly free and in line. I have a heavy drilling machine to bore up to 8″ diameter, two holes at once, fixed this way. Like many other things, this dodge was the result of an accident. I came back after an absence from work to find that a whole lot of drills had been so badly bored that the spindles were no kind of a fit. To avoid throwing away so much work, I schemed the above dodge, and it answered so well that I now use it for almost all double bearings.

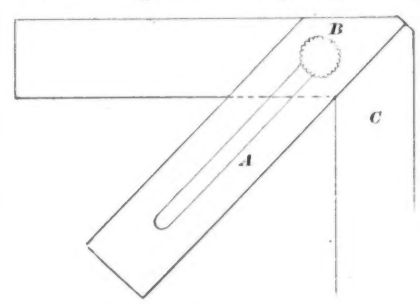
JOHN W. NEWALL.

London, England.

Toolmakers' Square.

Editor American Machinist:

Here is a little tool which I find very handy in "tool making" work. It is a combination of a square, center square and bevel, consisting of but three pieces, including set screw. *C* is a square of $\frac{1}{8}$″ steel, *A* a blade (with slot and one end beveled 45°, other end square) of $\frac{1}{16}$″ steel; *B*, thumb screw. It is set for center square by a scribed line (45°) on square. By scribing a few more lines any sided figure may be gauged, hexagon, octagon, etc. It is also a center gauge, and blade *A* can be swung any angle where bevel is wanted.



TOOLMAKERS' SQUARE.

FRED. H. COLVIN.

The Milling Machine—Its Construction and Uses.

BY JOHN J. GRANT.

Having described in previous articles various processes of milling flat and irregular surfaces with cutters of the same profile as the pieces to be milled, I will now endeavor to show some of the possibilities of producing curved or irregular surfaces with the common straight cutter. Milling of this class is termed bridge, profile, or cam milling, according to the machine or fixture used. The different kinds of milling mentioned above can only be done where the radius of the curves to be milled is greater than that of the milling cutter itself. The appliances necessary for bridge milling are, the ordinary plain milling machine with a fixture made especially for it. Profile milling is of the same class, but is generally done on a regular profiling machine. Cam milling is done on a machine called a cam cutter; in this machine the cutter spindles and the spindle holding the work to be milled, revolve in opposite directions.

Bridge milling is generally resorted to where the pieces to be milled have a greater radius than it is practicable to mill in the regular cam cutter, or, again, should the pieces be of greater length than it is possible to mill crosswise in the regular milling machine. I am not thoroughly familiar with the manner of finishing the link motion of the locomotive, but can see where a properly constructed machine of this class would do such work with exactness, and at a very slight cost as compared with the planer.

It is of course not necessarily confined to large work, small pieces being done very profitably. For instance, the shuttle of the modern sewing machine, having a circular shuttle race, where it is absolutely necessary to have the shuttle of the same radius as the race. This is a good example of this class of milling, and the one I will take as an illustration.

Fig. 1 represents the front elevation of a part of a milling machine having a fixture on its platen.

Fig. 2 is an end elevation, showing the position of the cutter, the piece in position to be milled, and the former resting on the bridge.

It will be seen by reference to Fig. 1 that the fixture for holding the work is hinged at the back end of the platen, the front end resting on a bridge, or a piece fastened to either the head or bed of the machine, as may be most convenient. This bridge has a surface on top of hardened steel, rounded, or sometimes a roll, so that it presents at all times only a line bearing to the former.

The hinged fixture has a former fastened to the bottom, adjustable by screws, and resting on the top of the bridge during the operation of milling. The outer end of the fixture is generally held down by either springs or a weight; this, however, is not always necessary, as the feed of the carriage is from the joint of the fixture, and the motion of the cutter as indicated by the arrow, thereby causing a downward pressure on the work and preventing the fixture from lifting.

Where it is possible to put the bridge directly under the center of the cutter the former will be of precisely the same profile as the piece to be milled, but in case it is necessary to put the former forward of the cutter, the former will be changed in shape, as the fulcrum of the lever is constantly changing with the forward movement of the feed. It will be seen that a piece clamped in the fixture and fed under the cutter will assume the shape of the former, or rather the shape of the model from which the former was produced.

There are various methods of laying out formers for bridge milling, but the quickest and most practical is to put into the cutter spindle a blank cutter or arbor of about the same diameter as the cutter to be used; exact diameter is not essential, so that it is smaller than the smallest radius to be cut. Fasten to the seat of the fixture intended for the former a blank piece of steel coated with blue vitriol. In place of the bridge fasten a scriber, place the model of the piece to be milled in the fixture, hold the outer end of the fixture up against the blank cutter in the spindle, and either by power or hand feed the carriage the length necessary to produce a line on the blank former the entire length of the model; work the former to the line and harden.

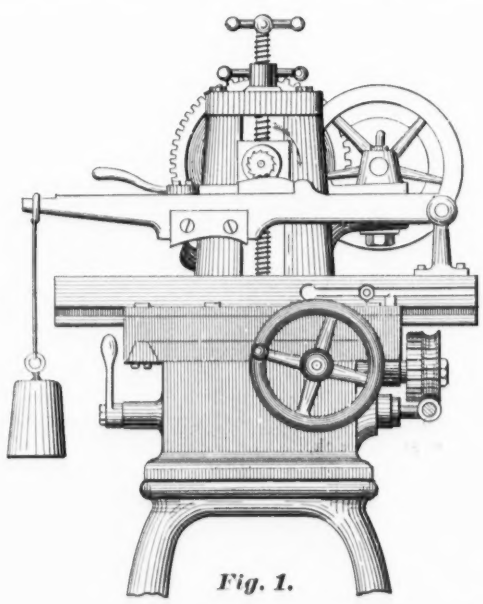


Fig. 1.

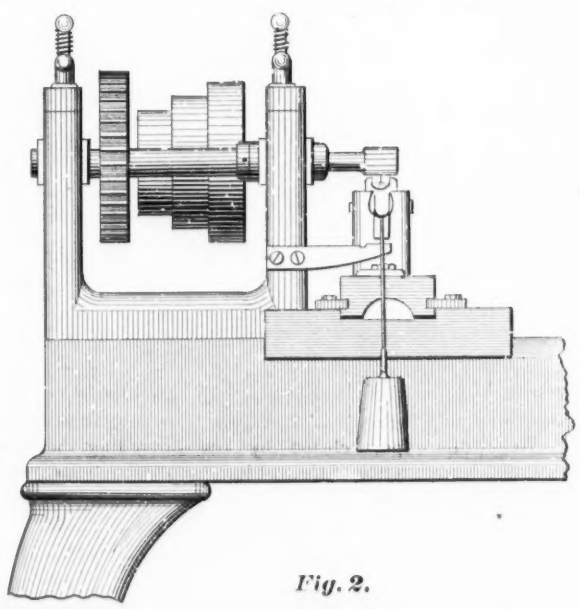


Fig. 2.

BRIDGE MILLING.

This arrangement for milling irregular forms has not received the attention from mechanics that it deserves. The advantages it possesses over the profiling machine are many, among which are cost of machinery and less cost for attendance, as the profiling machine requires the constant attention of the operator, while in bridge milling one man can run four or more machines. This of itself is enough, in these days of close competition, to give it a place in the front rank of milling attachments. Another feature is the perfection of the shape produced and the small cost for cutters, as compared with those that reproduce their own profile, the cutters used in bridge milling being small, straight, and often of the kind known as shank cutters.

A building and loan association has been organized by the employes of the Chicago and Northwestern railroad. This plan of getting a home is justly popular.

New High Speed Engine.

We illustrate with this the new high speed engine, built by the Fitchburg Steam Engine Company, Fitchburg, Mass.

As will be seen, the bed is of the style known as the "Porter" bed, so largely used in some of its modifications where great rigidity is required, as for high speed.

The governor is of the same type as that used in the independent valve engines made by this company. In this governor successful effort has been made to reduce friction to a minimum, which correspondingly increases closeness of regulation; the eccentric does not touch the shaft at all.

The valve is of the balanced piston type, with provisions for adjustment for wear.

The crank shaft has counterbalanced plate cranks, of somewhat peculiar construction.

These engines are built in sizes from 20 to 100 horse-power for electric lighting and for general use. All parts are made in duplicate, by the use of special tools and machinery.

Extracts from Reports of Committees, and Discussion at the Master Mechanics' Convention.

LOCOMOTIVE PREPARATION.

MR. JAMES MEEHAN, C., N. O. & T. P., finds it necessary to wash passenger engines after making 632 miles, and freight engines 474 miles, the equivalent of four days' service in each case, mud being the main impurity with which he has to contend. Plugs in fire-box legs opposite each arch pipe and under waist of boiler near smoke arch in which to introduce hose.

Jet of cold water at about 30 lbs. pressure he finds efficient means of cleaning his boilers. He considers it desirable to let his boilers get cold between trips, and never permits banking of fires, having them cleaned at the end of each trip. He uses the fire arch and baffle plate, and cleans tubes by removing same and using scraper through tubes. Fills his boilers after washing them with cold water, requiring on an average 20 minutes each, and requires one hour to get steam, using $\frac{1}{8}$ cord pine wood; cost 25 cents. Uses Greenwade's device for heater and blower. Cost to erect for 16 stalls, $87.49. Estimates saving about 20 cents per engine fired.

MR. COCKFIELD (C. & N. Ry.) in a 29 stall engine house uses two No. 58 Nathan boiler washers, washing 7 engines every 24 hours. These are supplied by an upright boiler 48 × 124 in. at 90 lbs. pressure, which gives 50 lbs. pressure at nozzle through 50 ft. of $2\frac{1}{4}$ in. hose, water being warm when entering boiler; can regulate temperature to any point, and finds great advantage from the use of hot water for this purpose and for refilling boiler when washed. Does not allow steam to be blown off through blow cock, and considers it essential to allow engine to stand two hours after steam is blown off before water is let out; uses oval head pipes and connections to blower, and blow cock to use steam from live engines, or stationary boiler to hasten steaming up. Has let water out of 18 × 24 engine, refilling same, and made steam enough to come out of house in one hour and thirty minutes. Can refill boiler in 8 minutes, and get 50 lbs. of steam in 25 minutes. Estimated fuel consumption to wash out and fire up, 330 lbs. per engine.

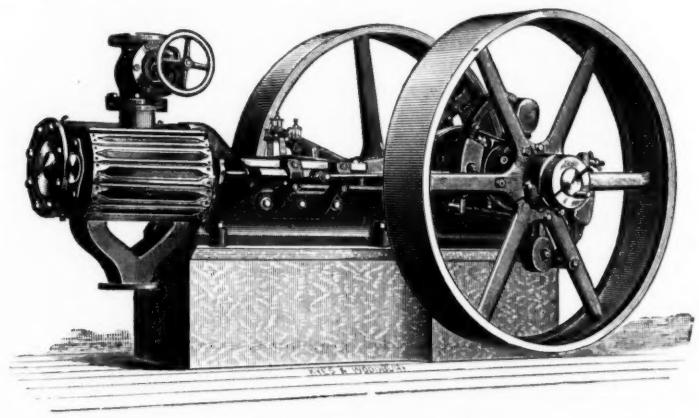
MR. BARNETT, G. T. Ry. of Canada, washes boilers once a week, or about once every 1,000 miles. Boilers are supplied with brass washout plugs in the four corners of fire-box above foundation ring, in back and front, tube sheets and on back head of boiler, also well up on both sides of shell over crown sheets, enabling washers to reach every point with washout nozzle. Blows steam and water from engine to be washed into a storage tank, to be used from there for filling boilers that have been washed.

Uses pressure of 60 or 70 lbs. on nozzle for washing. Uses live coal from sand dryer to start fire, and trusts to natural draft for same. Does not permit fires banked at terminals. Cannot give cost in money, but estimates the saving from use of hot water at from one to two hours.

MR. GENTRY, R. & D. R. R., sees no advantage in mud drums. Makes it a rule to wash boilers once a week. Allows steam blown off through blow cock, but at reduced pressure. Has to take down baffle plate or arch to clean tubes, but is experimenting with a combined steam and water washer for this purpose. Uses steam from stationary boiler to heat water and work blower of dead engines. Has system of underground attachments for connection of blow cock and blower. Does not use steam from live engine for any purpose. Fires up with pine wood, cost 21 cents per engine. Estimates saving over cold water one-half less wood and one-third of time.

TRACTION INCREASERS.

The committee on this subject consisted of Messrs. R. H. Briggs, D. D. Shaver, and T. J. Hatswell. A circular of inquiry was issued. The report consisted principally of thirteen answers, and very little information of any value was elicited. Mr. James Meehan had tried traction increasers and did not believe in them. He believed that using the weight of the tank for the purpose put an unnatural strain on the frame of the tender and engine, besides requiring too much attention from engineer as regards fluctuation of coal and water constantly going on. If the driving springs are arranged to carry with flexibility the ordinary weight of engine they would be too light to carry the additional weight transferred by a traction increaser, and if heavy enough to meet this increase they would obviously be too rigid for normal weight of engine.



NEW HIGH SPEED ENGINE.

MR. LAUDER had tried several traction increasers and abandoned them because he considered they were worthless.

MR. MACKENZIE had tried one of Dees' patent, and advised its use on all eight-wheel engines. Cost of maintenance for two years was nothing.

MR. BARNETT thought they might be of use on a tank engine or pusher too light for her work. He would not think of applying the device to a new engine, and considered the theory a mistake.

The committee had no opportunity to investigate any device except the Dees. Mr. R. H. Briggs, chairman, had used this device and obtained from 10,000 to 15,000 pounds extra weight on the drivers at will, the advantages of which were apparent. The report closed by recommending the continuance of the subject for another year.

MR. BRIGGS could not realize why a traction increaser applied to an engine known to have too little weight on drivers was not of benefit.

MR. LAUDER objected to having the committee continued. Thought there was not enough in the subject to warrant its being continued Devices of the kind have been tried by the majority of roads in this country, and thrown away as of no earthly use.

MR. MACKENZIE had one traction increaser on his road, and it certainly gave good results.

PRESIDENT JOHANN thought a traction increaser was an attachment to a locomotive for which there ought to be no earthly necessity.

MR. HICKEY favored traction increasers. Thought that to carry full weight all the time for the adhesion needed, when engine was working at its maximum capacitity, was putting an excessive weight where it was not needed. Wanted to have the means provided to supply the greatest adhesion at the times it was needed.

SECRETARY SETCHEL did not think it was proper to design a locomotive so that a traction increaser would be necessary. But every engine now uses a traction increaser in the shape of a sand-box, and that means of increasing traction often does a great deal of damage. Thought there were cases where the traction increasers under consideration were an advantage.

ROD PACKING.

In reply to the queries of the committee the fact was brought out that metallic packing was considerably used.

JOHN PLAYER used metallic packing of his own design. He said: "The cost for 1886 for Babbitt rings and abestos for renewals was $2.10 per engine. Average mileage 33,900 or a little less than $6\frac{1}{4}$ cents per 1,000 miles. This packing runs equally on valve stems or piston rods. No trouble in keeping it tight. Composition, tin eighty parts, antimony ten parts, copper one part. Have been using this packing for the past seven years, and experience proves the wear on rods and stems to be exceedingly small."

F. L. WANKLYN, of the Grand Trunk, uses metallic packing. He says: "So favorable has the experiment been in the use of this packing with us, which dates from the beginning of 1882, that I have orders to equip all our standard engines, passenger, freight and shunting, with it. The packing is known as the United States Metallic Packing, and the company is authorized to manufacture it under royalty. The introduction of metallic packing into the glands of the air pumps was an idea of our own which has since been taken up by the U. S. Metallic Packing Company. The opinion of enginmen running engines equipped with this packing is most favorable.

THOS. B. TWOMBLY reports that neither hemp nor any form of fibrous packing is used upon his road. Upon pistons the "Jerome" packing is used, and upon valve stems a design of his own, as shown upon blue print No. 3. The first cost of "Jerome" packing per engine is about $11. The cost of maintenance per engine per annum for same about $1.50. The metallic rings need renewal about once in eight months. The valve stem packing is inexpensive and simple. Composition: Antimony, 30 parts; lead, 70 parts. He says: "With this device we have no difficulty in keeping valve stems tight; but the 'Jerome' packing on valve stems resulted in total failure—caused by the shoulders which were worn upon the stem by unequal travel. The metallic packing which we use, both for piston rods and valve stems, is eminently satisfactory. I have had rods running in hard service for seventeen months, with a reduction in diameter of 1-64th of an inch, and with a surface like glass; valve stems also give us almost no trouble."

E. L. WEISGERBER reports that he uses hemp for pumps, and soapstone for pistons and valve stems. The cost per 1,000 miles per engine for soapstone is 25 cents. No metallic packing is used. He states that he thinks that the use of an oil cavity on glands, whereby sufficient lubrication can be secured, prolongs the service of the packing.

JOHN S. COOK says: "We have metallic packing on the pistons and valve stems of 25 locomotives; 23 having the "United States" and the "Jerome." I am well pleased with it and intend to apply it as fast as it can be done economically. On some engines it worked well from the start, which encouraged perseverance, and now it is working satisfactorily on all classes of engines. I enjoy complete immunity from bent piston rods, and find greatly decreased wear on rods and stems.

G. H. PRESCOTT reports that he has placed upon the pistons and valve stems of about 50 engines on his road a packing invented by R. W. Kilmer, an engineer on his line (as shown upon sketch No. 4). He says: "The wear on pistons and valve stems is about the same as with hemp, depending greatly upon the attention given it by the engineer. It can be placed in any ordinary stuffing box without change. The cost of a full set for one 11x24 engine is $4.00, without royalty. It has not been in use long enough to say whether it is cheaper than hemp," but thinks it is, and it gives less trouble. The composition is $\frac{3}{4}$ lead, $\frac{1}{8}$ block tin, $\frac{1}{8}$ antimony. Owing to the vertical play of the crosshead more difficulty is had in keeping pistons than valve stems tight with this packing.

W. H. STEARNS reports that he uses "Silver Lake" and "Prepared" locomotive packings. These compare quite favorably with each other. Upon piston rods he uses the "United States Metallic Packing." He says, if valve stems are held central by the yoke, they give very little trouble.

JOHN W. MCKENZIE reports that he uses only hemp on pistons. Upon valve stems he uses three babbitt rings, each ring cut three times, with a rubber sleeve on the outside. This will run 20,000 miles, and by removing the rubber sleeve will run 20,000 miles more. With this packing he finds less trouble on valve stems than pistons.

W. H. THOMAS reports that he uses hemp and soapstone, and also finds the "Eagle Packing" very good and serviceable. Has used asbestos with good results—a great deal depending on the engineer on its use. He also states that he has in use "United States Metallic Packing," which he has run 100,000 miles, without requiring repairs; and he does not see why metallic packings will not give good results on pistons or valve stems, if properly cared for.

F. G. BROWNELL reports that he has in use upon all engines on his road the "Brownell Patent Packing" [shown upon blue print No. 5] for the past year, and upon some engines on an adjoining road, which come under his charge, for 6 months. They are all giving the best satisfaction. Asbestos costs 10 cents per 1,000 miles. Soapstone and flax costs very materially more than this.

J. N. LAUDER reports that he uses hemp to some extent, but uses none of the prepared fibrous packing, and especially avoids the use of rubber. Upon his road the "United States Metallic Packing" is largely used [as fully shown upon blue print Nos. 6 and 7.]

An English friend calls our attention to the "Sloper" method of perforating postage stamps with the initials of the firm or company using them, as having been long in vogue in England, and wonders why somebody does not introduce it in this country. It is well calculated to prevent the theft of postage stamps.

Sea serpents are being discovered now at so many places, even fresh-water lakes, that it will soon be a poor kind of summer resort that cannot afford to keep one of its own. It might be well for some enterprising concern to start in and manufacture them, and put them regularly on the market.

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NEW YORK, JULY 30, 1887.

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Jackson Bailey.

It is our painful duty to record the death of Jackson Bailey, editor of the AMERICAN MACHINIST, and one of its founders. The sad event took place at his home, in Brooklyn, on Thursday afternoon July 7, 1887, at half past five o'clock. His disease was malarial in its origin and developed into consumption of the bowels. His mind was clear to the last, and he felt prepared for the coming change. The inevitable end came peacefully, and, comparatively speaking, without intense suffering. The funeral took place from his residence, Sunday, July 10, interment being made at Cypress Hills Cemetery, Brooklyn. He leaves a widow.

Mr. Bailey was born May 12, 1847, at Schenectady, N. Y., and his age was therefore 40 years, 1 month and 25 days at the time of his decease. At fifteen years of age he enlisted as a private in the One Hundred and Thirty-fourth Regiment of New York Infantry, and served three years, to the close of the Civil War. He was at Missionary Ridge and in several other battles, and served in Sherman's army during the march to the sea.

Mustered out of service at eighteen years of age, he entered the State Normal School at Albany, N. Y., from which he graduated in due course and afterward was engaged in teaching. Later on he connected himself with a New York publishing firm, which position he relinquished to become New York representative of the *American Manufacturer and Iron World*, of Pittsburgh.

In November, 1877, the AMERICAN MACHINIST was established as a monthly journal devoted to the machinery trades. It was at that time the only journal in existence in this country published exclusively in the interest of the several classes of mechanics indicated in its title. The paper prospered from its first issue, and in June, 1879, was changed to weekly issue with enlarged facilities, Mr. Bailey retaining the post of editor. The subsequent history of the AMERICAN MACHINIST and of Mr. Bailey's continuing connection with it, are too familiar to our readers to need recounting here.

At the time of his death Mr. Bailey was first vice-president of the New York Press Club, an organization in the prosperity of which he felt a great degree of interest. At a meeting of the club, specially called for the purpose, appropriate resolutions were passed, and a committee of fifteen members was appointed to represent it at the funeral.

Mr. Bailey was also a member of the Masonic order, and was connected with the Electric Club of New York, the American Institute of Mining Engineers, and the American Society of Mechanical Engineers, in the preliminary organization of which latter body he took part with others. He was abstemious and temperate in his habits, possessed a remarkable memory, quick and accurate judgment, a clear, incisive manner of writing, and his written words, however hurriedly penned, seldom needed revision. His manner was unassuming; he was popular with acquaintances, and greatly beloved by his friends and associates. His was a warm, true heart, and his life, thoughts and speech were singularly clean and pure. Knowingly he never wronged a living soul. He was a thinking man, having opinions of his own on most subjects of general interest, and it was characteristic of his marked individuality, that these opinions were always clearly conceived and firmly held. Measured by years, his life was short; measured by thoughts and motives, and aspirations, and deeds, none can say that he did not do much to make this world an easier and better world to live in for many souls.

Rewarding Inventive Workmen.

Some of the greatest inventions have been made by those who are in the everyday work to which these inventions relate—not in this work as managers, but simply as workmen. There is reason why this should be so. Such men see the reason for that which they invent; that is, if they are competent to do the inventing. Such men are, however, too often deprived of anything like the true value of what they devise. It would be nearly right to say that they never get the value of it. On the other hand, it is neither uncommon nor unnatural for a workman who plans some additions to a machine or process to overrate its importance. It may be only a small part of the machine or process; but it may look to the inventor like the major part. Yet cases in which a workman makes valuable inventions or improvements, and gets not even credit for it, are not rare. Instances in which he makes minor improvements, hardly meriting the name of invention, yet valuable to the manufacturer, are much more common. As a rule, the manufacturer is willing to pay for these improvements of his machine or his process, but does not see his way clear to do so.

This is an important matter, as well to the manufacturer as to the workman. Invention is mainly what has enabled manufacturers in this country to compete with cheaper labor in European countries. Americans have excelled in bringing science, as interpreted by practical men, to their aid, in manufacture. It is more necessary that they do so now than ever before, and will be still more necessary in the future.

The important point is for manufacturers to devise some fair plan for rewarding workmen who help along their business by thinking beyond their work. Apparently English manufacturers understand how to do this much better than it is understood in this country. There it is very common to find a fund set aside for this purpose, and we are credibly informed that this is found to be a wise business operation. It gives workmen an incentive to think of processes, as well as of the mere routine work connected with these processes; and, say what we will, nothing sharpens the wits, and brings out the best a man is capable of, equal to a prospective remuneration in vulgar dollars and cents. When a fund is set aside, and strictly devoted to rewarding workmen who use their inventive faculties, it really amounts to an increase in wages. That is, this increase is always in the way of the thoughtful mechanic.

As previously intimated, we do not believe that American manufacturers are not willing to reward inventive workmen. But the question, How shall it be done? is not easily answered. For reasons that need not be discussed, an increase in wages will not generally work satisfactorily. We believe that the English plan of paying directly for such invention will be found the best, and we believe this plan might be very generally adopted in this country with excellent results.

In the foregoing, allusion is not had to such sweeping inventions as should be covered by patents in the inventor's name: but to the little things that American workmen are so competent to plan, and which they would multiply beyond belief if sure of some kind of pecuniary reward.

In larger inventions that get beyond shop practice, employers could more often than they do assist workmen, to the advantage of both parties. Our patent laws are good, but they are of human origin, and hence imperfect. Often the poor inventor finds himself unable to cope with capital and cupidity arrayed against him. In the interest of invention he ought, if he is a workman, to have such influence in his favor as his employer could very frequently give him.

We are not making a special plea in favor of invention. This is not necessary. But those who can best utilize inventions and those who can best make them should have some mutual bond.

We have, previous to this, insisted that the manufacture and storing of explosives—from gunpowder up to the high explosives—should be in places remote from civilization, where the lives of those only who voluntarily put themselves in the way should be jeopardized. For this we have been taken to task by those who were intimately acquainted with the processes of manufacture, the argument being that there was really no danger, if proper and well-known precautions were observed. This may be—doubtless is—true; but the record of recent disaster to mills devoted to the manufacture of explosives, together with the protest of citizens exposed to the fury of such explosions, more than ever confirms us in our original opinions. It is not enough to show that with proper care there is no danger. There never will be proper care. The only safety—and this has been strongly emphasized of late—is to relegate all explosive manufactories to the backwoods.

It is materially more trouble for the owner of a steamboat to change its name than it is for him to change his own name. For example, no application for change of name of a vessel over 20 years old will be received; if a vessel is over 10 years old very extensive repairs must have been made before change of name will be authorized. If the boilers of a vessel are over 10 years old no change of name will be authorized. Vessels must be free from debt before name can be changed. The owner of a vessel must show very satisfactory reasons for change of name before it will be sanctioned.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common-sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials nor location will be published.

(315) N. W., Portsmouth, N. H., writes: I have a chimney in my barn that does not draw. It is straight and new-plastered inside. It is 15½ inches by 19½ inches, and 24 feet high. What is the trouble with it? *A.*—It is too low. Carry it up higher and your trouble will disappear.

(316) W. J., Muskegon, Wis., asks: Will you please give me a receipt for polishing copper? *A.*—Copper can be polished the same as other metals. Use fine emery at first, finishing with crocus and pulverized charcoal. Use the charcoal last, with a piece of flannel cloth.

(317) W. M., Worcester, Mass., writes: Please give me a simple rule for finding the diameters of cone pulleys? There is a table given in your issue of October 15, 1881, but I cannot understand it. *A.*—Proportioning cone pulleys is a complicated problem. We cannot give you any further information on the subject than that you will find in the AMERICAN MACHINIST for the past six years.

(318) T., Springfield, Mass., asks: 1. What is the diameter and thickness of U. S. standard hexagon nuts from ¼ inch to 3 inches? *A.*—The diameter (through parallel sides) is, for rough heads and nuts, 1½ times the diameter of bolt plus ⅛ inch. Finished heads and nuts are 1-16 inch less. 2. Should the bolt heads be same size as nuts? *A.*—The depth of rough nut is equal to diameter of bolt; finished nut 1-16 inch less. The depth of head is ⅛ its diameter.

(319) E. E. B., Mt. Holly, N. J., writes: 1. I have a cylinder 3' x4" which has no ports. I wish to drill and chip ports. How large should they be to get the most work out of the engine? *A.*—You can make the steam ports ¼ inch by 2½ inches; exhaust port, ¼ inch by 2½ inches. 2. I have a boiler 12 inches diameter by 3 feet long, with 20 tubes 1 inch diameter; no water leg. Will this make steam enough for the engine? *A.*—No; not more than half large enough for full power.

(320) Subscriber, Troy, N. Y., asks: Can you tell me the amount of heating surface required per square foot of space at different pressures of steam for steam heating? *A.*—The requisite amount of heating surface is proportioned to the exposure, and cannot be determined except upon careful examination by an expert in steam heating. But little more surface is required for low than for high pressure, as these terms are used in steam heating.

(321) H. S., Rochester, N. Y., writes: 1. Can you give me the coloring matter used in lacquer for both red and yellow brass? *A.*—You can get any desired color by making your lacquer as follows: Put 4 ounces best gum gamboge into 32 ounces spirits turpentine; also put 4 ounces dragon's blood into the same quantity spirits turpentine, and 1 ounce annotto into 8 ounces spirits of turpentine. These three mixtures are to be made in different vessels. They should be kept exposed to the sun for three weeks, when they are ready for use. Any desired color may be had by mixing these solutions to produce it. 2. What mixture is used for dipping brass to prevent tarnishing? *A.*—Alcohol, 12 gallons; seed-lac, 9 lbs.; turmeric, 1 lb. to the gallon; Spanish saffron, 4 ounces to the gallon.

(322) F. W. C., New Rochelle, N. Y., writes: 1. Please give me a short description of the marine boiler known as the Scotch type. *A.*—It is an ordinary cylindrical boiler, with cylindrical furnaces inside of shell. The heat and gases pass over the bridge wall into a combustion chamber, then through flues of comparatively larger diameter into the back connections; from this the gases return through tubes of small diameter into the up-take, and out through the smoke-stack. 2. What are the special merits of the Scotch boiler? *A.*—The form of Scotch boiler is best adapted for purposes where large boilers are required, because very nearly the whole boiler is composed of cylindrical surfaces, and consequently its form is the strongest and the safest to adopt for largest boilers. 3. State the best kind of boiler, in your opinion, for a launch of about 30 tons. *A.*—A boiler of the locomotive type.

(323) A. E. H., Brookings, Dak., asks: 1. How can I rebabbitt crank-pin boxes? *A.*—Crank-pin boxes should be rebabbitted at a machine shop, where there are facilities for boring them after babbitting. 2. How can I babbitt the main journals of an engine of 160 horse-power? *A.*—We suppose you mean to ask how you can rebabbitt these boxes. Jack up the shaft so as to cut the babbitt out, then set it in line with the engine, wrap a thickness of drawing paper around it and pour the babbitt. If you are not a skilled mechanic, which we infer you are not, you had better not undertake the job. 3. What are the comparative advantages and disadvantages of one or two boilers? Will the steam pressure be the same in each boiler, or will it vary? *A.*—The steam pressure will be the same in two boilers properly connected. We cannot advise whether to use one or two boilers without knowing all the conditions.

(324) J. A. W., Baltimore, Md., asks: How can I find the area of a cylinder of any diameter? *A.*—Square the diameter and multiply by 0.7854. Study any elementary arithmetic, and you will find out all about it. 2. I should like to know how to find the diameter of a cylinder whose area was one square inch? *A.*—To find the diameter of a circle, the area being known, divide the area by .7854, and extract the square root of the quotient. You will save yourself much trouble by buying an engineer's pocket-book, in which you will find this worked out for you, and given in the form of tables. 3. How can I find the radius and length of a link? *A.*—Study the articles on Modern Locomotive Construction, appearing in the AMERICAN MACHINIST.

(325) J. C., Dunkirk, N. Y., asks: What is the horse-power of a boiler of the following dimensions: Diameter, 52 inches; length, 10 feet; 64 tubes 3 inches diameter; grate surface, 4 feet by 4 feet? *A.*—About 40 horse-power. 2. What is the shortest length and smallest diameter of stack that could be used with such a boiler? *A.*—See AMERICAN MACHINIST of April 23. 3. In computing the heating surface of a boiler, do you take the surface of shell exposed to fire, and add thereto the inside surface of tubes. *A.*—Yes. 4. What is the rule for finding the proper diameter of stack for boiler? *A.*—See AMERICAN MACHINIST, April 23. 5. What size boiler would it require to furnish steam for a 12"x24" engine, run at its full capacity? *A.*—That would depend entirely upon the kind of engine, the speed at which it was run, as well as the extent to which means were provided for forcing the boiler.

(326) R. E. P., Camden, N. Y., asks: Will you please tell an apprentice the meaning of lap and lead of a slide valve? *A.*—If you put the valve at the center of its travel, each outside edge will project beyond the port. The distance to which these edges overlap the ports is called the outside lap of the valve, or sometimes the steam lap, and again simply lap. With the valve in the same position, if the inside edges overlap the ports on to the bridges, this overlap is the exhaust lap. With the valve properly connected and the engine on the dead center, the extent to which the valve has opened the port to admit steam is called the steam lead, and the extent to which the inside edge has opened the exhaust port is called the exhaust lead. When the matter is spoken of as simply lead, steam lead is understood.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

New Book for Machinists. See adv., p. 16.

Link-Belting.

Send for catalogue of Link-Belting.

Over 50,000,000 feet of Link Belt in use.

Link-Belt Machinery Co., Chicago and N. Y.

Shafting Straighteners J. H. Wells, Tampa, Fla.

Edw. Sears, Wood Engraver, 169 William st, N. Y.

Steel Name Stamps, etc. J. B. Roney, Lynn, Mass.

Air Compressors, Rock Drills. J. Clayton, 43 Dey st., NY

Exhaust Tumbl'g Bbls. Henderson B's., Waterb'y, Ct.

For Improved Cooper Stoves, send to Variety Machine Co., Warsaw, N. Y.

Light articles built to order by the American Sewing Machine Co., Philadelphia, Pa.

The Best Upright Hammers run by belt are made by W. P. Duncan & Co., Bellefonte, Pa.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Pattern and Brand Letters. Vanderburgh, Wells & Co., cor. Fulton and Dutch sts., New York.

Selden Packing, for stuffing-box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., N. Y.

Solid Nickel-Seated "Pop" Safety Valves. Consolidated Safety Valve Co., 111 Liberty st., Y. N.

Robbs' Patent Composition for case-hardening. Send for circular. F. W. Tasney, Paterson, N. J.

Davis Key-Seating Machines, kept in stock, by Manning, Maxwell & Moore, 111 Liberty st., N. Y.

"Bradley's Power Hammers, the best in the orld." 20 sizes. Bradley & Co., Syracuse, N. Y.

Injectors, Ejectors, Oil Cups, Sight Feed Lubricators, etc. Arthur Appleton, 45 Cortlandt st., N. Y.

For Sale—Very successful Single-Valve Automatic Governor Patent. Address Patent, AM. MACH.

20", 25", 28" B.G. and S. F. upright drills for immediate delivery. Currier & Snyder, Worcester, Mass.

Ice and Refrigerating Machines. 124 built and all successful. David Boyle, 521 Monroe St., Chicago, Ill.

Drawing Materials, all kinds. Get catalogue. Mention this paper. G. S. Woolman, 116 Fulton st., N. Y.

The Improved Tabor Steam Engine Indicator, made and sold by The Ashcroft Mfg. Co., 111 Liberty st., N. Y.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large; prices low. Frasse & Co., 92 Park row, N. Y.

Machinists' supplies, brass goods, m'f'rs' supplies, polishing materials, all kinds wire, metals, etc.; in any quantity. Jordan & Gottfried, 208 Canal st., N. Y.

For Best Return Steam Traps, Pressure Regulators, Positive-Acting Pump Govs., Back-Pressure Valves. T. Kieley, 11 W. 13th st., N. Y. Send for des'n.

Curtis Pressure Regulators, Curtis Return Trap, Curtis Damper Regulator. See July 16, p. 14. Send for circular No. 17. Curtis Reg. Co., Boston, Mass.

Press for sale. Quick-acting; hole in bed, 8x5 punches to center of 13-inch sheet; 2¼-inch shaft; also four-spindle Drill. B. W. Payne & Sons, Elmira, New York.

Reed's Engineer's Hand-Book to the Local Board Examinations. Eleventh edition revised and enlarged, with 260 diagrams and 36 large plates. 8vo., cloth, $4.50, post-paid. Catalogue of books free. E. & F. N. Spon, 35 Murray st., New York.

"Indicator Practice and Steam Engine Economy." By F. F. Hemenway. Contains plain directions for using the indicator, and making all required calculations from the diagram; also the principles of economy in operating steam engines, and current practice in testing engines and boilers. Price, $2 post-paid. Published by John Wiley & Sons, 15 Astor Place, New York.

"Binders" for the AMERICAN MACHINIST. Two styles—the "Common Sense," as heretofore sold by us, and mailed to any address at $1.00 each, and the "New Handy," mailed at 50c. each. The former has stiff board covers, while the latter has flexible covers, the full page opening flat. Either will hold the entire 52 issues of any volume. AMERICAN MACHINIST PUB'G CO., 96 Fulton st., New York

MANUFACTURES.

Malden, Mass., is to have high-service water-works.

Water-works are to be built at South Williamsport, Pa.

Petersburg, Ill., will issue bonds for building water-works.

W. C. Aycock will build a sash, door and blind factory at Griffin, Ga.

The citizens of Washington, Ga., are agitating the question of water-works.

Oliver Ingersoll will build a factory at 243 Plymouth street, Brooklyn, N. Y.

The Huntsville (Ala.) Electric Light Company will put in an electric l ght plant.

Twenty thousand dollars has been raised for building water-works at Hudson, Wis.

Lewis Krulewitch will build a brick factory at 8 and 10 Birmingham street, New York.

Wm. A. Wheeler's machine shop at South Norwalk, Conn., has been destroyed by fire.

The Tuskaloosa Coal, Iron and Land Company contemplate building a furniture factory

Parties interested in building a cotton or woolen mill, or both, can find an opening at Shreveport, La.

The Orguinette Company, of Meriden, Conn., is to build a brick factory 250x50 feet and four stories high.

The Standard Gas Light Company will build a shop and gas-works on 115th street, near Pleasant street

The Boston Twist Drill Company—capital stock, $60,000—have recently begun business as manufacturers.

John B. Steinert, 837 South Eighth street, St. Louis, Mo., expects to erect a forging shop to employ about 12 men.

The McMillan Car Works, at Minnaville, Mo., will build a foundry, 85x221 feet. The capacity will be 200 wheels per day.

The Water-Works Company, of Geneva, N. Y., has decided to purchase new pumping engines having a capacity of 2,000,000 gallons daily.

The city of Chicago, Ill., is likely to contract with responsible parties for lighting the Chicago river and its branches within the city limits by electricity.

Horace H. Lane, Huntingdon, Pa., is putting up a new foundry, 40x50 feet, as an addition to his machine shop. Expects to have it in operation by August 1st.

The Peck, Stow & Wilcox Company, Southington, Conn., are building a brick forge shop in addition to their present forge shop. The addition will double their capacity.

The machine shops of the Pittsburgh and Lake Erie Railroad Company, at Chartiers, Pa., have been destroyed by fire. The loss is estimated at $50,000, partly insured.

Augustin Smith's sash and blind factory, Seneca Falls, N. Y., will be removed to the northwest corner of Walnut and Water streets, to make room for the new Monro flouring mills.

The Davis & Furber Machine Company, builders of woolen machinery at North Andover, Mass., have their new shop well under way. They are employing between 600 and 700 men in their old shops.

The Georgia Railroad and Banking Company, Augusta, Fla., will erect a two-story building, the lower story to be used for a machine shop, and the upper floor for manufacturing car windows, blinds, etc.

The cutlery works at Unionville, Conn., are closed for a few days, and it is thought want of water will oblige some other shops to close soon. A steam engine missionary might do good work in that town just now.

The Betts Machine Company, Wilmington, Del., have published a new and enlarged catalogue of machine shop tools and appliances manufactured at their works. It is very complete in illustrations and well indexed.

The Babcock Printing Press Manufacturing Company, New London, Conn., send us a neatly-printed and illustrated catalogue of the printing presses manufactured by them. It contains numerous testimonials from users.

W. T. Brown, of Clinton, Me., has invented a snow plow which he believes is to revolutionize the business of removing snow obstruction. Revolving knives chop up the snow, and suitable mechanism will throw it to either side.

The Kalamazoo Wagon Company, Kalamazoo, Mich., find the three large buildings forming their present quarters are much too small for their enlarging business, and a fourth is to be built, five stories high, 250 feet long and 65 feet wide.

It is said the Chicago, Burlington and Quincy R.R. proposes to push down to Fort Worth, Tex., and that arrangements are already completed for making that the terminus of the southwestern system, and for building large repair shops at that place.

The Skaneateles Water-Works Company, Skaneateles, N. Y., have been granted, at a special meeting of the Board of Trustees, a franchise for laying mains and supplying the village with water. The works are to be in operation within two years from December next.

The Straight Line Engine Company, Syracuse, N. Y., recently received an order by cable from Turin, Italy, for four 80 horse-power engines. Some time since they filled an order for one engine to the firm which now orders, that one evidently selling the four now ordered.

Reed & Lovatt, silk manufacturers, of Paterson, N. J., have decided to remove to Weatherly, Pa., about twelve miles from Mauch Chunk. The town will build a mill for the firm, and will exempt it from taxation for a number of years as a matter of encouragement for it to locate there.

The Jacksonville (Fla.) *News-Herald* says: "There is talk of a cotton warehouse being erected by the F. R. and N. as a result of arrangements between that company and some of our business men. If this is true, Col. Papy's project of a cotton compress will probably be realized."

The Florida Sugar Manufacturing Company, Kissimee, Fla.—capital stock, $300,000—has been organized, with Hamilton Disston, of Philadelphia, Pa., as president; Charles E. Etting, 327 Walnut street, Philadelphia, secretary and treasurer; and R. E. Rose, general manager. The company succeeds the St. Cloud Agricultural and Improvement Company.

The Pacific Water Company has been incorporated at Los Angeles, Cal., by H. H. Markham, of Pasadena; F. L. Raymond, of San Gabriel; N. Vanderlip, of Santa Ana; L. W. Dennis, C. H. Bradley, of Los Angeles. The company will acquire water rights, etc., and sell water in the San Gabriel Valley, or the San Pascual or Santa Anita Ranches.

A new wood-working enterprise has been started in Belfast, by Edgar Macomber, in manufacturing toy yachts for the market. Mr. Macomber has invented machinery for their manufacture himself, by which the sides of the yachts are pressed into shape. The yachts are sloop-rigged, and are made in four sizes, of 15, 18, 24 and 30 inches respectively.

The certificate of incorporation of the Boiler Tube Cutter Manufacturing Company, organized with a capital stock of $8,000, to manufacture boiler tube cutters at Liverpool, Onondaga County, N. Y., has been filed. Chas. A. Barnes, Daniel Mathews, A. Heibert Crawford, John R. Young, William H. Lynn, George Bassett and William F. Lee, of Liverpool, are incorporators, and also the trustees for the first year.

The directors of the Westfield Power Co., Westfield, Mass., have voted to buy the property north of their manufacturing buildings on Elm street for $7,000. In the rear of the lot will be erected a three-story brick building, 35x25, as an annex for the Textile Manufacturing Co., who have outgrown their present quarters in the building adjoining. Eventually brick buildings will occupy the whole front. It was also decided to increase the capital stock of the corporation.

The Webster, Camp & Lane Machine Company, of Akron, Ohio, manufacturers of steam engines and hoisting machinery, have found it necessary to enlarge their works. The work is already well advanced on a substantial brick erecting shop, 50 feet wide by 116 feet long, with an L 40 feet wide connecting this with their present shop. Adjoining this is a 40x70 foot brick smith shop. The erecting shop is to have a 20 ton traveling crane traversing the whole length of the building.

The large new building of the Bridgeport Forge Company, on Howard avenue, is approaching completion, and will soon be ready for occupancy. It is of wood, two stories high in the shape of an L, 182x160 feet. A brick addition has been built in the rear for the engine and boiler room and blacksmith shop. Gould Brothers are the builders. The same contractors have well under way the new building of the Bridgeport Rolling Mill Company, also on Howard avenue.—*Connecticut Real Estate Record.*

Co-operative factories after the Minneapolis pattern are springing up all through the West. Of these seven are coal mines, five furniture works, three clothing shops, two carpenters' shops, three nail mills, two planing mills, three pottery works, five publishing companies, four stove foundries, two soap factories, two tobacco factories, and a baking powder company, a box factory, a broom company, a cooper's shop (at Detroit), an expressmen's club, a foundry, a match factory, a meat-packing shop and a corn-cob factory in Missouri.

F. E. Reed, Worcester, Mass., has issued a 90-page catalogue of machine tools manufactured by him. Mr. Reed writes us: "I manufacture a line of engine lathes from 10 to 30 inches swing, besides special lathes for making studs and bolts, for chucking and for brass finishers. Also upright drilling machines, of various sizes, as large as 22 inches swing, multiple spindle drills, and a line of milling machines. I have added to my capacity from time to time, and am working 100 men at present. I have always endeavored to manufacture as good a tool in my line as could be made, and have every facility for doing this class of work to the best advantage."

John W. Newall, engineer, Arnold road, Bow, London, England, sends us a catalogue of various articles, mostly in the way of small tools for machinists' use, made by him. He writes: "I notice a paragraph in your paper about the printing of a Glasgow firm. I fancy I know who it is, and beg to enclose you a sample of his work, which may interest you. The inside of book may also interest you. You will note that I have a decided leaning to American practice. The point about the swivel hangers is this: The adjusting screws (male and female), balls and cups are all *cast*, so that the only machinery required is to joint the bearings and bore them. As to speed of work, I can bore both the cored seats of a 2¼" coupling, two cuts through, *complete*, in 7½ minutes." We may add that the printing is very nicely done, and the cuts are excellent.

Sales of the Babcock & Wilcox boilers for the months of May and June were as follows: Gordon, Strobel & Laureau, Philadelphia, seventh order, 292 horse-power; S. D. Kendrick, Glen's Falls, N.Y., 51 horse-power; Swift Manufacturing Company, Columbus, Ga., third order, 292 horse-power; Gordon, Strobel & Laureau, Philadelphia, eighth order, 1,218 horse-power; Luray Cave and Hotel Company, Luray, Va., 45 horse-power; Mineral Railroad and Mining Company (Luke Fidler Colliery), Shamokin, Pa., 240 horse-power; Mineral Railroad and Mining Company (Cameron Colliery), Shamokin, Pa., 240 horse-power; Solvay Process Company, Syracuse, N. Y., third order, 832 horse-power; Pennsylvania Steel Company, Baltimore, Md., second order, 3,840 horse-power; Columbus Buggy Company, Columbus, Ohio, third order, 250 horse power; Springville Company, Rockville, Conn., 244 horse-power; White Manufacturing Company, Rockville, Conn., 136 horse-power; Pencoyd Iron Works, Pencoyd, Pa., fourth order, 156 horse-power; D. S. Cook, Princess Furnace, Glen Wilton, Va., 312 horse-power; Geo. Westinghouse, jr., Pittsburgh, Pa., 170 horse-power; Bucyrus Gas Light and Fuel Company, Bucyrus, Ohio, 85 horse-power; Ch. Jacquin, New York city, for Knickerbocker Cottage, 25 horse-power; M. Camacho Roldan & Nephew, New York city, for Mexico, 122 horse-power—making a total of 8,589 horse-power.

Of the proposed scheme of changing the New York, New Haven and Hartford Railroad shops to a new town which is to be started in connection with them, it is announced that the committee having the matter in charge consists of Wm. D. Bishop, of Bridgeport; Henry Robinson, of Hartford, and Joseph Clark, of New York. It is expected that this committee will select a site somewhere between Woodmont and Milford, or else come to Stratford and locate on territory between Tea-Party lane and the Ferry road, where a large plot of land already owned by the Consolidated road is used for storage purposes. There are 1,500 men employed in the shops of the company, and there is an average of five persons to a family, which would make 7,500 persons. There are 5,000 men on the pay roll of the company.

Machinists' Supplies and Iron.

NEW YORK, July 14, 1887.

There is no change in the general state of manufacturing or in the supply trade. Shops appear to be fairly filled with orders for the time of year, and for the most part are running full-handed. Business is fairly divided, though in a few cases shops are crowded fully to their capacity. Most builders of machine tools are finding ready sales for their products; steam engine builders are also quite generally busy, some being decidedly driven.

Iron—American pig continues to sell in small lots, but aggregate sales are sufficient to keep furnaces busy. Neither buyers nor sellers are inclined to hold much stock. We quote for standard brands No. 1 X Foundry, $21 to $21.50; No. 2 X, $19.50 to $20.50; Grey Forge, $17.50 to $18.50.

Scotch Pig—Sales of Scotch brands are slow, but prices are still firm in Glasgow. Sales have been made of Coltness, $22.50 to $23; Gartsherrie, $21.50 to $22; Summerlee, $21.50 to $22; Eglinton, $20.50 to $21; Dalmellington, $20.50 to $21.

Antimony—Hallett's, 8¼c; Cookson's, 9c.

Copper—There has been advance in prices owing to speculation. Lake has sold at 10½c.

Spelter—Refined continues to sell at 5¾c. to 6c.

Tin—Advances in London have had the effect to increase prices here. Jobbing lots of Banca have sold at 23½c.; Straits and Malacca, 23.60c.

WANTED

"Situation and Help" Advertisements only inserted under this head. Rate, 30 cents a line for each insertion. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Situation as foreman by a first-class machinist of ten years' experience. Address W. S. F., AM. MACHINIST.

Draftsman wants position; 14 years' experience on general machinery and steam engines. Address L. W., AM. MACHINIST.

Wanted—Position as foundry foreman; 20 years' experience; best of references. Address 222 King st., Wilmington, Del.

Wanted—A good draftsman acquainted with laying out steam plants and figuring boiler tests, weights, etc. Address, with references, Box 43, AM. MACHINIST.

Wanted—Active young man who can be useful in machine shop or drawing room; technical graduate with considerable shop practice preferred. Address S. R., AM. MACHINIST.

Wanted—A position by a young man as an assistant in a drafting room for three or four months during the summer. Address A. T. B., Box 196, South Bethlehem, Pa.

Wanted—A young man well trained in general machine shop work, who is competent to dissect pattern-making, may get a place as assistant foreman by addressing M. W., AM. MACHINIST.

Wanted—A man to travel for sale of injectors, oilers, lubricators and other boiler appliances; must be posted in injector trade, and be a good salesman and have good references. Address J., care AM. MACHINIST.

Wanted—To arrange with manufacturers of stationary boilers throughout the country to construct and put on the market my multi-tubular expansion boiler, of which the marine type is illustrated in July 16 issue of the AMERICAN MACHINIST. J. W. Walters, 162 South st., New York.

Wanted to Buy—A general assortment of patterns, such as boxes, pulleys, gears, hangers, etc., to use in a job shop; also flasks and crane and 42 inch engine lathe. Any one having such to sell at a low figure can find a customer by addressing S. Cole & Son, Lebanon, N. H.

Manufacturing Business for Sale—I have a long-established commercial business which requires my entire time; I also own controlling interest in and have been managing the business of a corporation manufacturing a useful patented machine, demand for which is growing more general each year. In past five years 150 machines have been sold at prices ranging from $125 to $1,000; all are giving best of satisfaction. I want to dispose of the manufacturing business to some person or firm having the financial and mechanical ability required to extend the business, which can be made a large one. Will stand thorough investigation. Address Box 40, care AM. MACHINIST.

✝ MISCELLANEOUS WANTS. ✝

Advertisements will be inserted under this head at 35 cents per line, each insertion.

Light mach'y of all kinds built at short notice Edmund Mills, 8 Dey st., Jersey City Heights, N. J.

Stationary boat engines, boilers, best, cheapest, 1 to 10 H. P. Washburn Engine Co., Medina, Ohio.

For Sale—One Bradley cushioned helve hammer. Apply to Arthur F. Whitin, Treas., Whitinsville, Mass.

To Engine Builders—For sale, new patent slide-valve cut off governor; acts direct on slide-valve Address to J. G. H., care AM. MACHINIST.

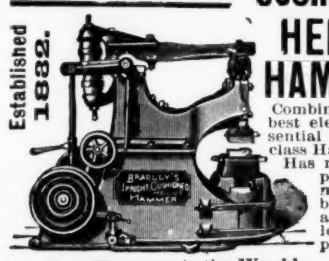
Special tools and machines for mfg. designed and built to order; mechanical and Patent Office drawings. I. A. Weston & Co., Syracuse, N. Y.

A. C. Christensen, mechanical and hydr. engineer, late chief draftsman for Henry R. Worthington. Designs and working drawings; also patent drawings. 26 Church st., R. 13 and 14, New York.

BRADLEY'S HEATING FORGES.

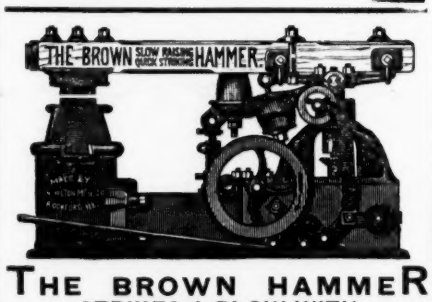
For Hard Coal or Coke. Indispensable in all shops to keep **Bradley's Cushioned Hammers** and men fully employed and reduces cost of production.

BRADLEY'S UPRIGHT CUSHIONED HELVE HAMMER

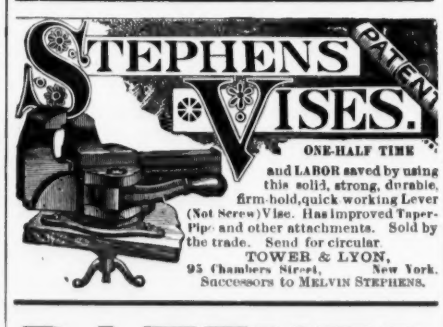


Combines all the best elements essential in a first-class Hammer. Has more good points, does more and better work and costs less for repairs than any other **Hammer** in the **World.**

BRADLEY & CO. Syracuse, N.Y.



THE BROWN HAMMER
STRIKES A BLOW WITH
Double the Velocity That it Raises the Hammer.
A NEW MOVEMENT! SEND FOR DESCRIPTION.
KNOWLTON MFG. CO., KING ST., ROCKFORD, ILL.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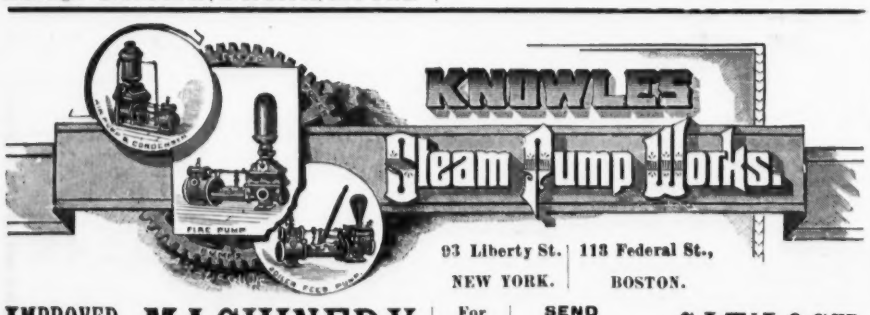
PATENT
ONE-HALF TIME
and LABOR saved by using this solid, strong, durable, firm-hold, quick working Lever (Not Screw) Vise. Has improved Taper-Pipe and other attachments. Sold by the trade. Send for circular.
TOWER & LYON,
95 Chambers Street, New York.
Successors to MELVIN STEPHENS.

PATENTS

R. G. Du Bois, Patent Att'y, 916 F St., Washington, D. C. Good references. Send for pamphlet.



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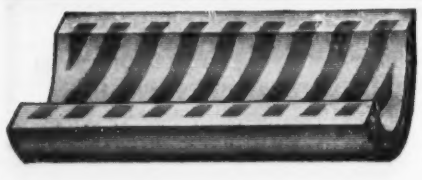

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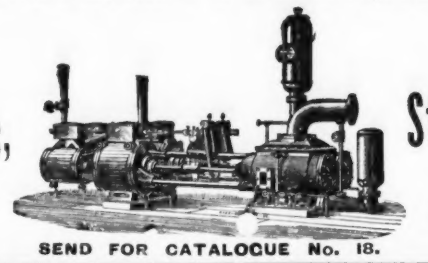

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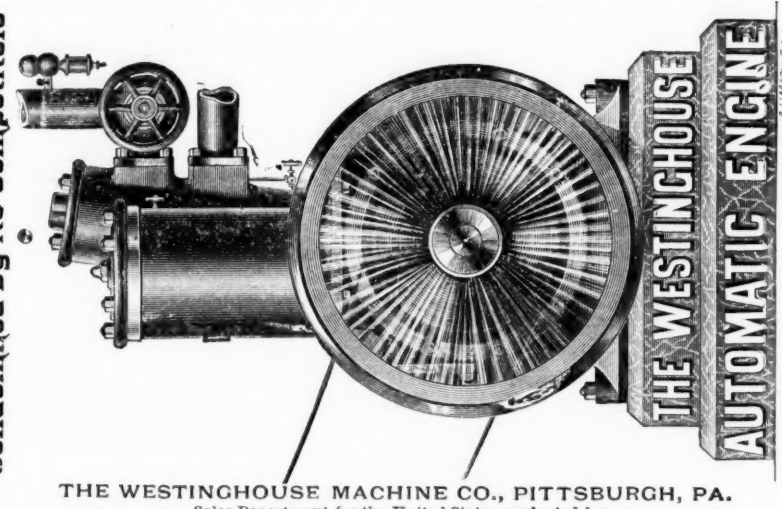

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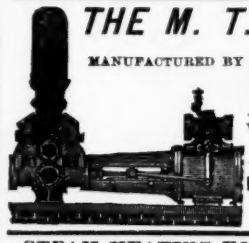

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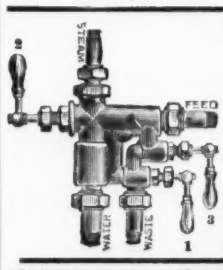

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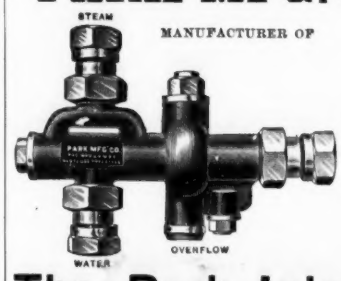

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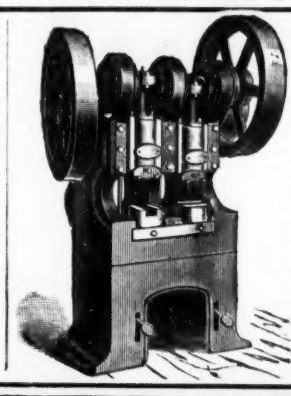

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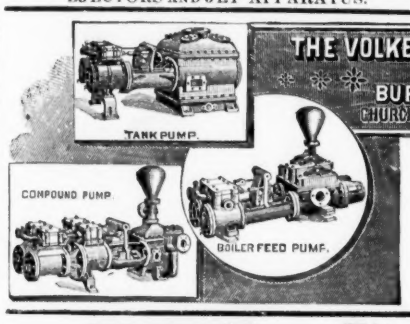

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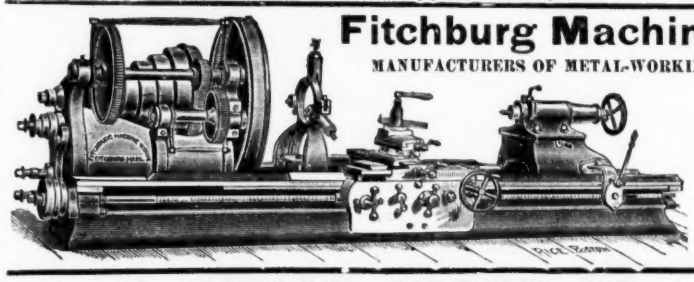

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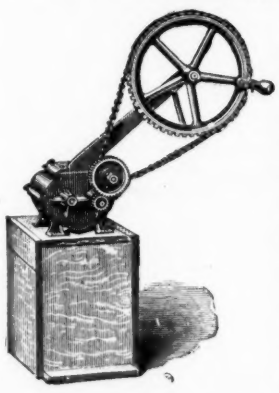

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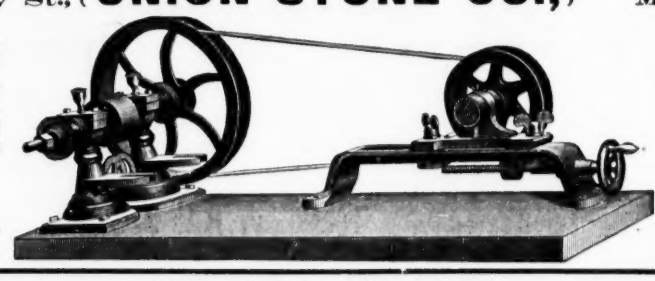

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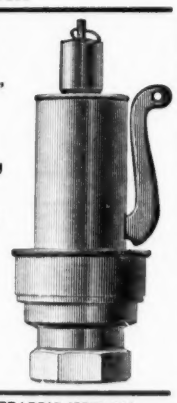

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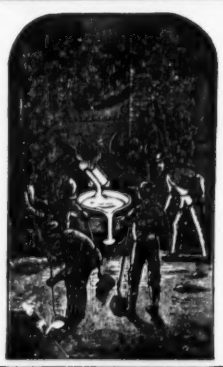

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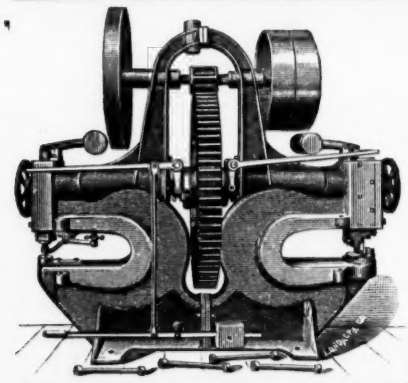
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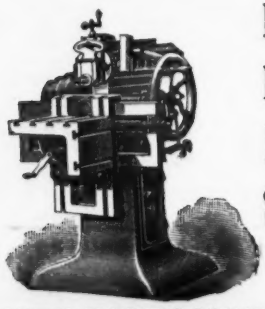
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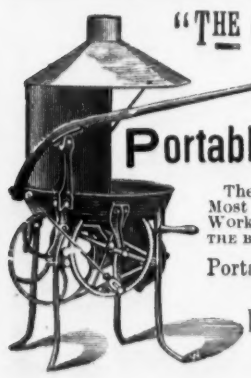
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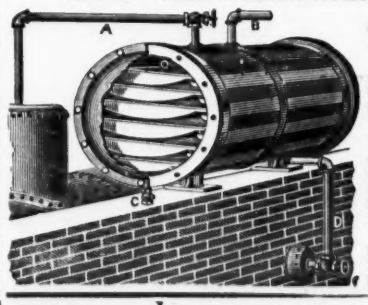

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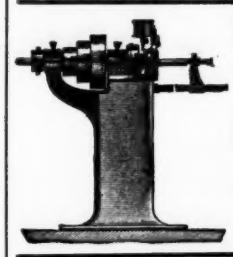
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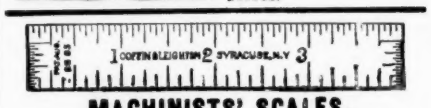

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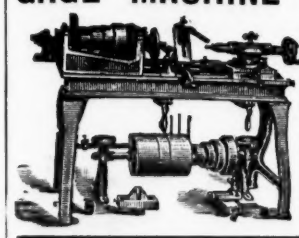
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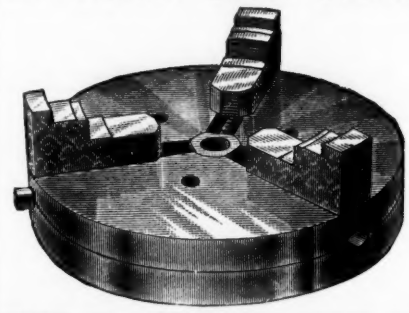
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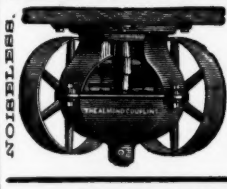
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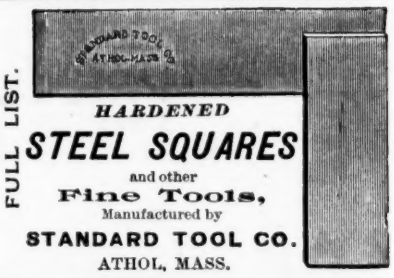
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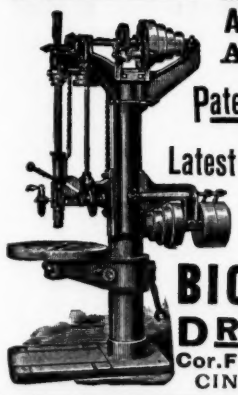

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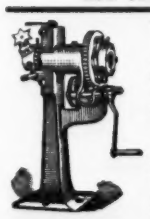

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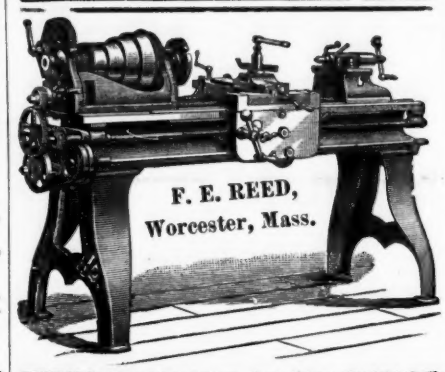

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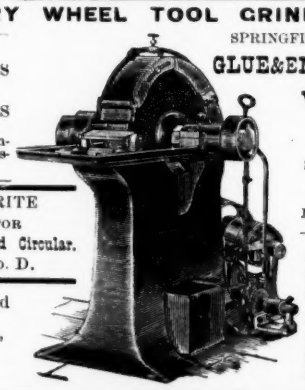

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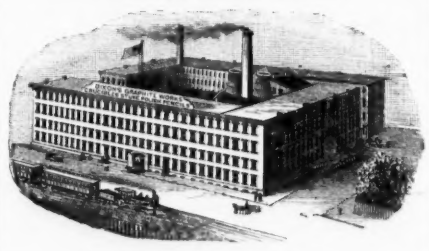

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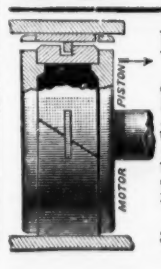

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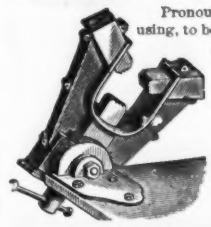

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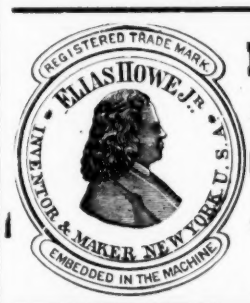

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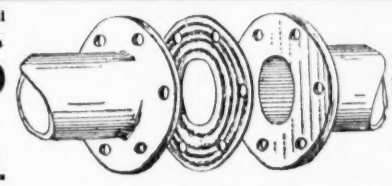

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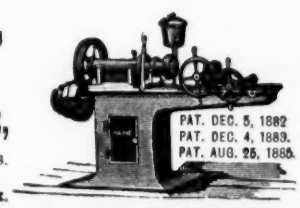

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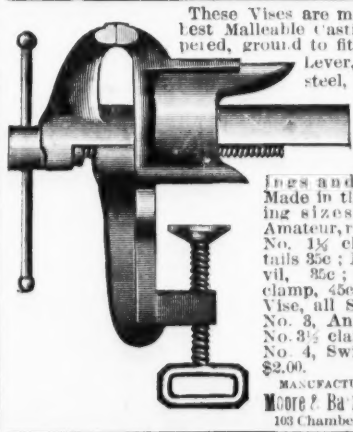

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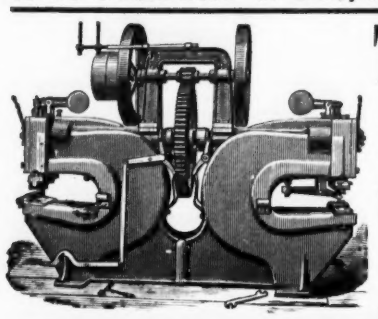

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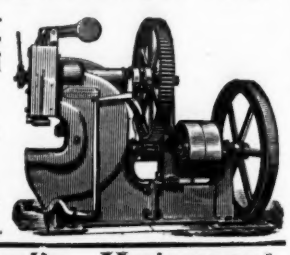

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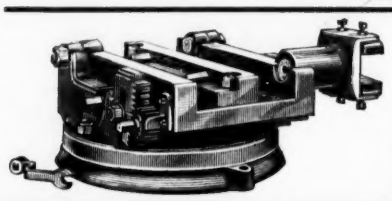

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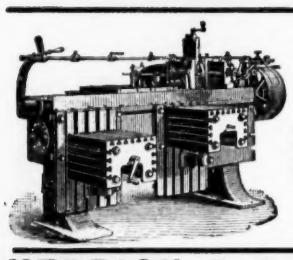

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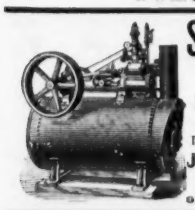

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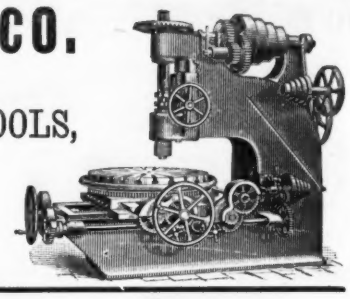

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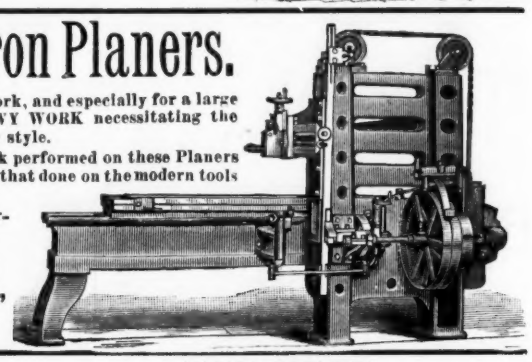

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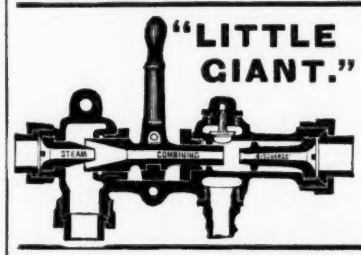

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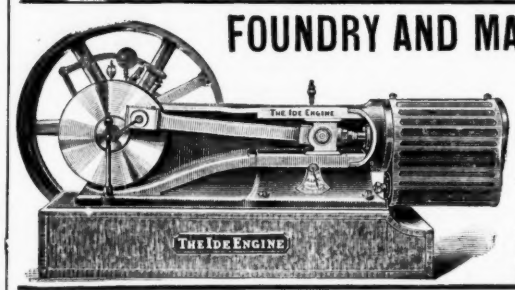

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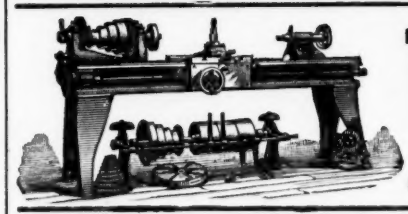

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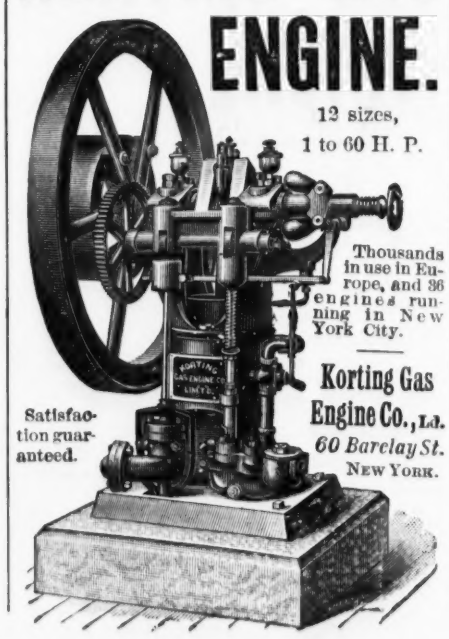

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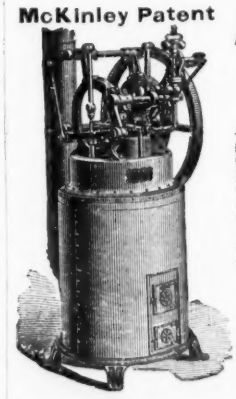

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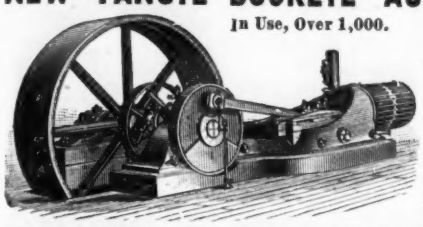

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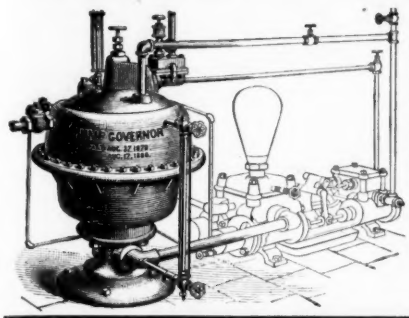

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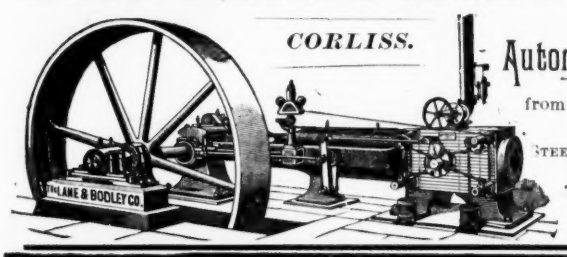

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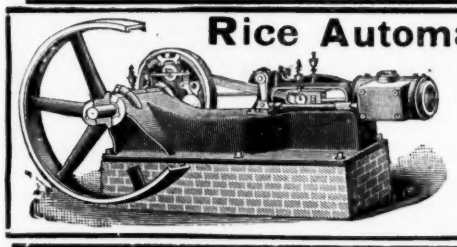

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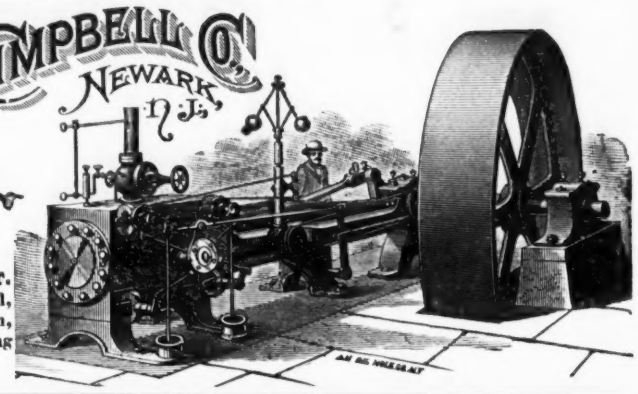

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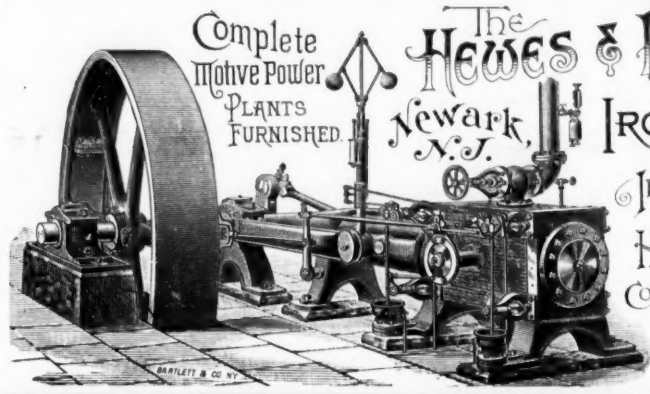

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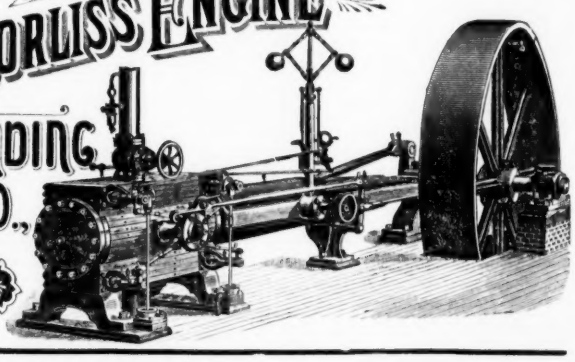

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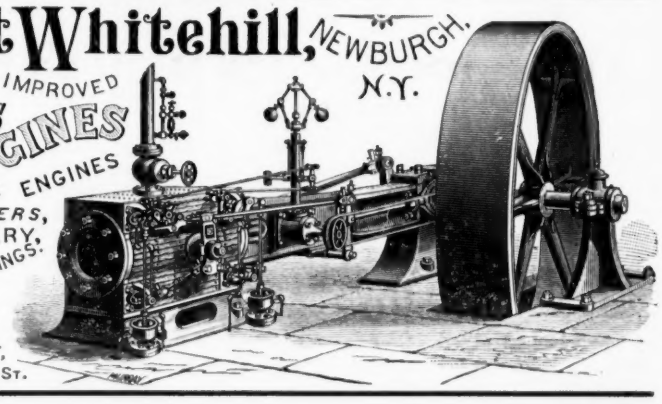

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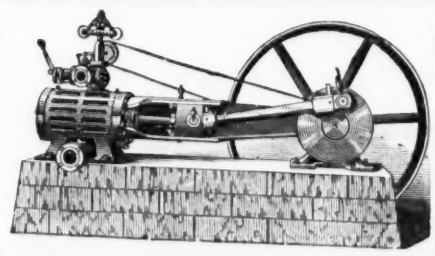

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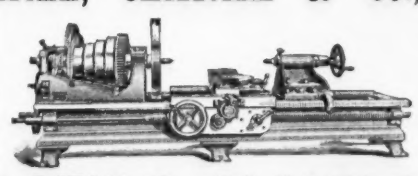

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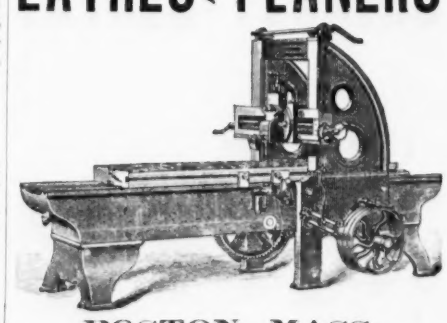

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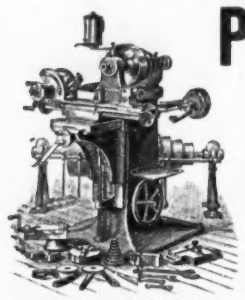

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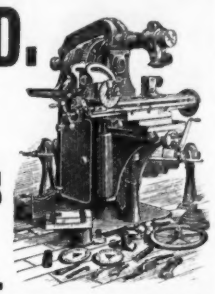

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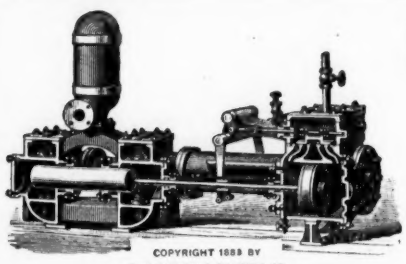

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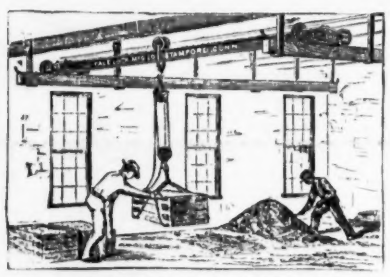

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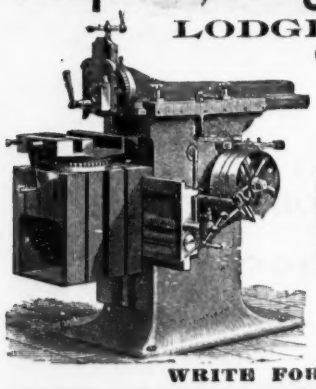

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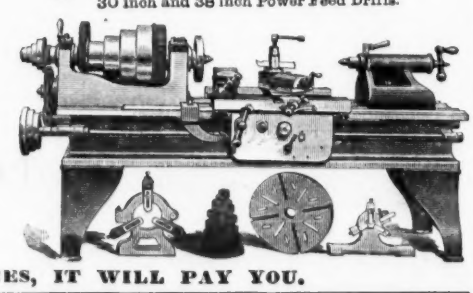

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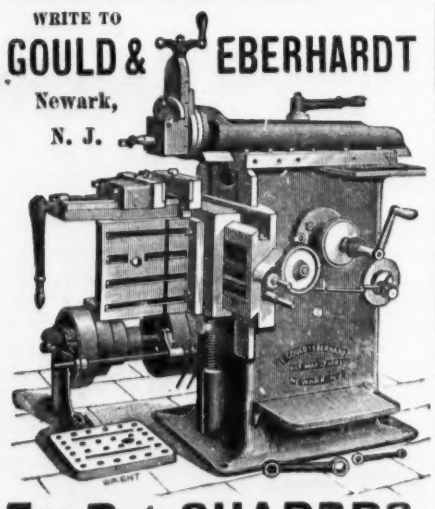

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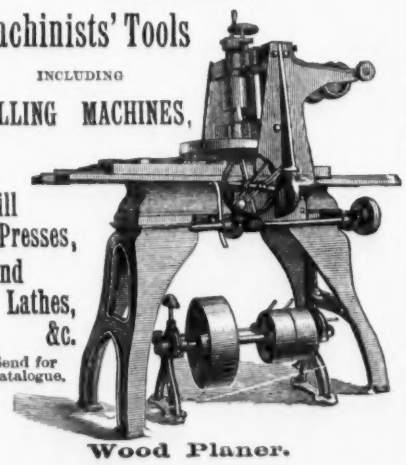

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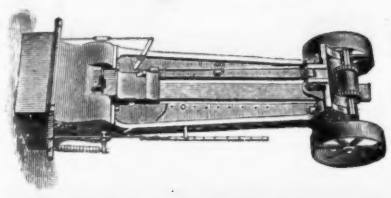

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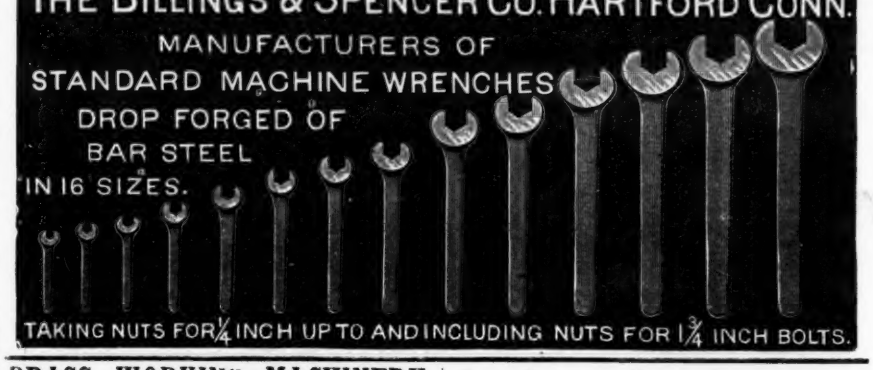

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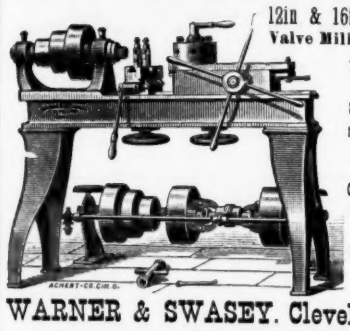

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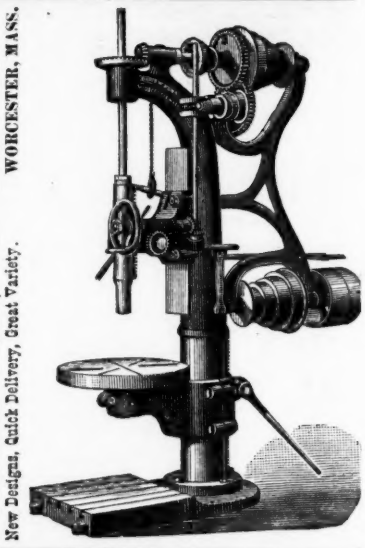

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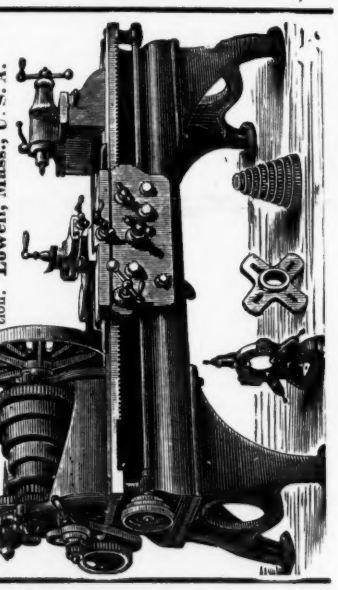

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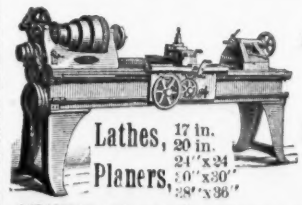

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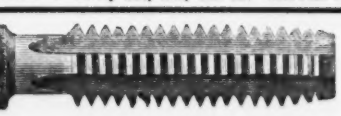

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